

AUTOMOTIVE INDUSTRIES



OCTOBER 1, 1949

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Aircooled Diesels Developed by Continental

Design Improvements in 1950 Nash Models

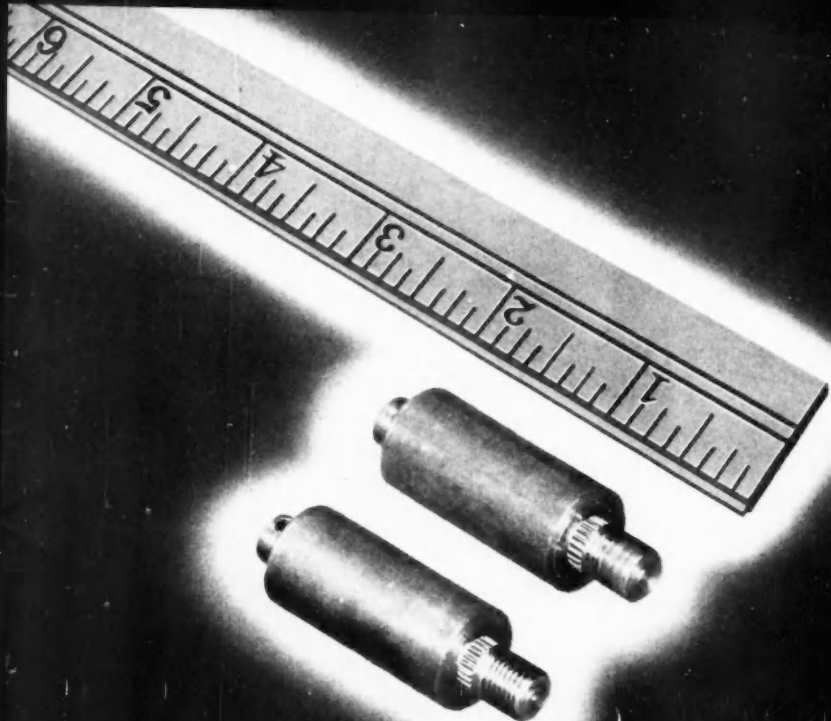
Outstanding Operations at Oldsmobile Rocket Engine Plant

Engine and Chassis Features of New Fiat Car

Automatic Inspection of Valve Lifter Dimensions

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A CANTON PUBLICATION



Steps up output on automatics . . .

THE PARTS shown above are produced and used by a Michigan company in the manufacture of lawn mowers. The parts are made from $\frac{1}{2}$ -inch bar stock of 1040 steel on a Cleveland single-spindle automatic. To make these lawn mower axles, the operations required are forming, knurling, threading, and cut-off.

In order to maintain a daily output of 500 to 600 lawn mowers, a high production rate was required on these parts. Various cutting oils were tried in an attempt to reduce tool wear and step up production. One product—Stanicut 137 BCS Cutting Oil—brought results that far exceeded those of the other oils. It increased tool life 50% over the best of previous results.

Stanicut Cutting Oils are effectively compounded to help your tools and machines handle the most difficult machining operations. To get the best possible tool life, accuracy, and finish on jobs involving soft metals or hard alloys, try these superior cutting oils. A Standard

Stanicut 137 BCS Cutting Oil

Oil Cutting Oil Engineer will help you choose the right oil for the job.

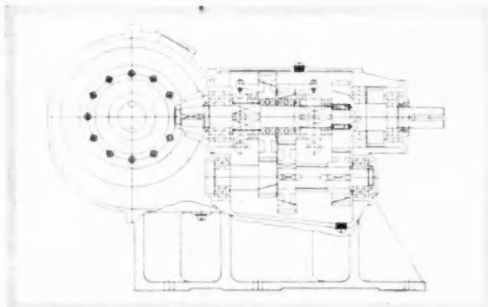
If your plant is located in the Midwest, write Standard Oil Company (Indiana), 910 South Michigan Avenue, Chicago 80, Illinois, to secure the services of the Engineer nearest you.

STANDARD OIL COMPANY (INDIANA)

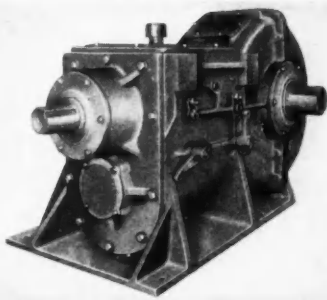


"Engineered-to-order"

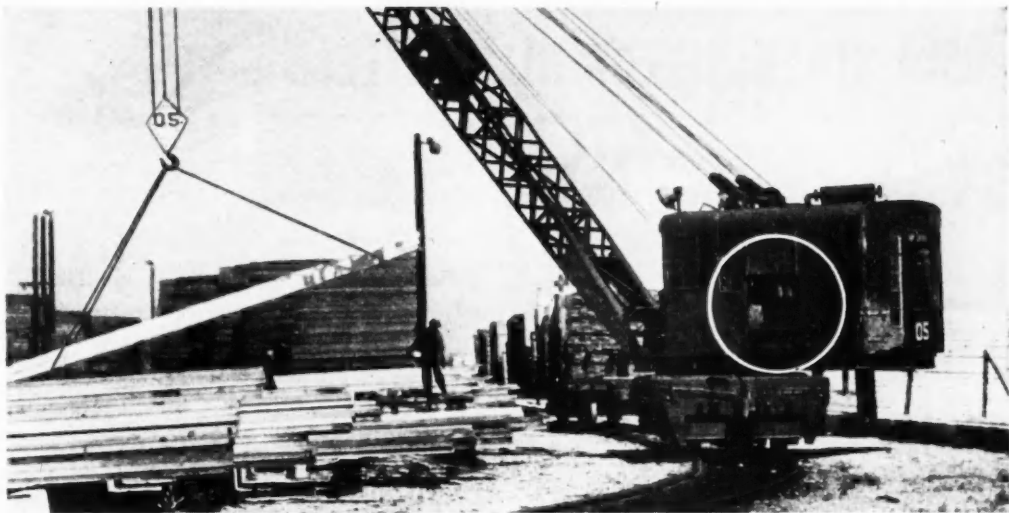
FOR LOCOMOTIVE CRANES
MADE BY OHIO LOCOMOTIVE CRANE CO.



Required by Ohio: a three-speed locomotive crane transmission of unusual ruggedness, for continuous heavy-duty service and with multiple speed changes to meet all operating conditions.



This special constant-mesh COTTA Transmission, helical type, was designed with right-angle drive to meet Ohio's needs. The built-in safety factors assure dependable performance, long life.



Because the terrific grind of a locomotive crane in action demands precision design and manufacture of essential parts, Ohio Locomotive has for 20 years come to COTTA for transmissions with the extra endurance required for heavy-duty jobs. If you have a special problem in power transmission, let our engineering staff help you. Write today.
COTTA TRANSMISSION CO., ROCKFORD, ILLINOIS



COTTA
HEAVY-DUTY
TRANSMISSIONS
PRECISION-BUILT-SPECIALLY
ENGINEERED FOR YOUR PRODUCT

How Design Engineers and Users make **MULTIPLE SAVINGS** with...



HIGH STRENGTH LOW ALLOY STEELS containing **NICKEL**

35-FOOT TRAILER NOW WEIGHS
2400-LBS. LESS

Use of "Cor-Ten," a high strength low alloy steel produced by Carnegie Illinois Steel Corp., helps Mechanical Handling Systems, Inc. to safely reduce weight of their redesigned trailers and loading skids.

Consider this car-hauling trailer:

Its cargo is always a definite number of new cars... a practically constant weight... so reduction of trailer weight could not be used for a corresponding increase in payload.

But the producer, Mechanical Handling Systems, Inc., of Detroit, Michigan, aimed for definite economies... prolonged trailer life, reduced oil and gas consumption as well as longer tire life obtainable by reducing vehicle weight.

Units were redesigned. All principal structural members of carbon steel were replaced by lighter gauges of "Cor-Ten," a copper-chromium-nickel alloy steel produced by Carnegie-Illinois Steel Corporation.

Experience proves that high strength low alloy steels

containing nickel provide three basic advantages:

1. High strength in the as-rolled condition, permitting important weight reductions.
2. Excellent response to such fabricating operations as forming and welding.
3. Exceptional resistance to corrosion, abrasion and impact.

Moderate in price, this type of steel has established notable performance records. A list of sources of supply will be furnished on request.



Don't Forget...

Get down—"INCO Booth, No. 302"—in your memo book of companies to visit at the **NATIONAL METAL EXPOSITION**, at the Public Auditorium in Cleveland, Ohio, Oct. 17th to 21st. Convenient facilities for discussing your problems with our metallurgists and foundry specialists will be available.



THE INTERNATIONAL NICKEL COMPANY, INC. 67 WALL STREET, NEW YORK 5, N. Y.

AUTOMOTIVE INDUSTRIES

October 1, 1949

Published Semi-Monthly

Vol. 101, No. 7

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AUTOMOTIVE INDUSTRIES, October 1, 1949

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YOUNG OFFERS THE

"HC"

HORIZONTAL CORE

ANOTHER VERSATILE
Vertical Air Discharge
UNIT FOR . . .

- ✓ Jacket Water Cooling
- ✓ Oil Cooling
- ✓ Gas Cooling, Condensing
- ✓ Steam Condensing



Basic "HC" Unit may be used in multiples for greater cooling capacity or combination of services.

IMPORTANT FACTS ABOUT THE "HC"

- LOW COST—small initial investment, economical maintenance.
- VERTICAL AIR DISCHARGE—eliminates cross wind effects.
- HIGHLY EFFICIENT—airfoil section fan.
- MULTIPLE INSTALLATIONS—provide greater capacity, combined services.
- NO VIBRATION—adjustable pitch fan mounted separately from unit.
- LARGE CAPACITY—water cooling, from 600,000 Btu/hr up; oil cooling, from 20,000 Btu/hr up.
- LOW HP REQUIREMENT—1 to 10 hp per fan.
- EASY INSTALLATION—simplified piping and frame construction.
- CORE GUARD SCREEN—protects cores from falling objects.

Here is another development by Young providing high efficiency cooling and condensing at low initial and operating costs. The Dual coil "HC" is designed for water and lube oil cooling. Manifolds are available for water cooling coils only. Four sizes, with 2, 4, 6 and 8 coil installations, provide exceptional versatility in heat transfer service. The 4 or 6 blade fan, serving each two coil unit, may be mounted directly on the fan motor shaft, or powered by a v-belt or gear speed reducer drive. Full details about the new "HC" Units, or other Young Heat Transfer Products, are available on request.

YOUNG HEAT TRANSFER PRODUCTS



YOUNG RADIATOR CO.

General Offices: Dept. 109-K, Racine, Wis.
Plants at Racine, Wis., and Mattoon, Ill.

DISTRIBUTORS • The Happy Company, 310 E. 10th St., Tulsa, I. Oklahoma.
Flournoy & Everett, Inc., 5041 Santa Fe Ave., Los Angeles 11, California. H. J. Young, 1364 Lake Shore Drive, Muskegon, Michigan. Others in Principal Cities.

OIL FIELD, HEAVY INDUSTRIAL, MUNICIPAL & CHEMICAL PROCESS COOLING EQUIPMENT

Engine jacket water coolers • Oil coolers • Steam and natural gas condensers • Natural gas coolers • Evaporative coolers and condensers • "VAD" Vertical air discharge cooling and condensing units

AUTOMOTIVE PRODUCTS
Gas, gasoline, Diesel engine cooling radiators • Heat exchangers • Intercoolers • Oil coolers • Super-charger intercoolers

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Convectors • Unit heaters • Heating coils • Cooling coils • Air conditioning units • Evaporative condensers

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Oil coolers • Super-charger intercoolers • Radiators • Heat exchangers • Valves • Regenerators

Keep Hydraulic Pumps Clean

**LIKE
THIS**



Note cleanliness of this part taken from a hydraulic pump. System charged with Texaco Regal Oil (R & O).



Ordinary oil was used in the hydraulic system from which this pump part was removed. Damage from rust and sludge resulted.

Photos Courtesy of American Engineering Co.

USE Texaco Regal Oils (R & O)

Make pumps and other parts of hydraulic systems last longer and work more smoothly by charging the systems with *Texaco Regal Oils (R & O)*. These world-famous, turbine-grade oils keep your hydraulic mechanisms operating at top speed and efficiency.

Texaco Regal Oils (R & O) are fully resistant to rust and oxidation, and are specially processed to prevent foaming. They keep hydraulic systems clean . . . protect pumps and valves against wear and fouling . . . assure smooth, responsive hydraulic action for longer periods of time.

There are suitable viscosities of *Texaco Regal Oils (R & O)* for every size and type of hydraulic mechanism. No "cutting back" is required. These quality oils are recommended by leading builders of hydraulic equipment, and many ship their units charged with them.

Let a Texaco Lubrication Engineer help you improve the efficiency of all your plant machinery. Just call the nearest of the more than 2300 Texaco Wholesale Distributing Plants in the 48 States, or write The Texas Company, 135 East 42nd Street, New York 17, N. Y.



TEXACO Regal Oils (R & O)

FOR ALL HYDRAULIC UNITS

MACHINE OF THE MONTH

PREPARED BY THE SENECA FALLS MACHINE CO. "THE Lo-swing PEOPLE" SENECA FALLS, NEW YORK

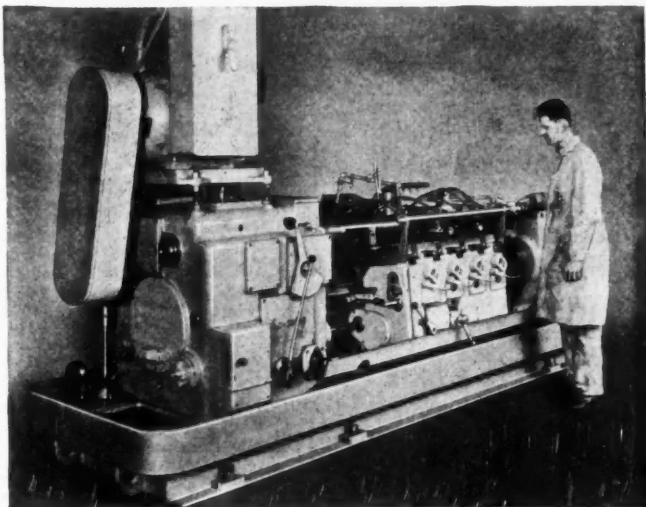
MODEL "AP" Lo-swing LATHE MACHINES ELECTRIC MOTOR SHAFTS

Problem: To rough turn, face shoulders and groove electric motor shafts machined in small and medium size quantities.

Solution: This new Lo-swing Semi-Automatic Lathe, featuring unlimited length of carriage travel thru rack and balanced twin pinion carriage feed, is ideal for machining short and medium run jobs economically. Unlimited carriage travel permits turning of short run jobs having long shoulder lengths with simplified tooling; multiple tooling may be used for long run jobs with short or long shoulder lengths.

The drawings below show a typical two operation tool setup on electric motor shafts which are being machined in small lots. Only the one tool is being used for turning each diameter regardless of the length of cut.

Machine setup is simplicity itself. First, the tool blocks and tools are mounted on the tool slides in the proper relation to each other and for the proper depth of cut. Secondly, two stops are set for controlling length of carriage travel in both directions and one stop for positioning the carriage in relation to the

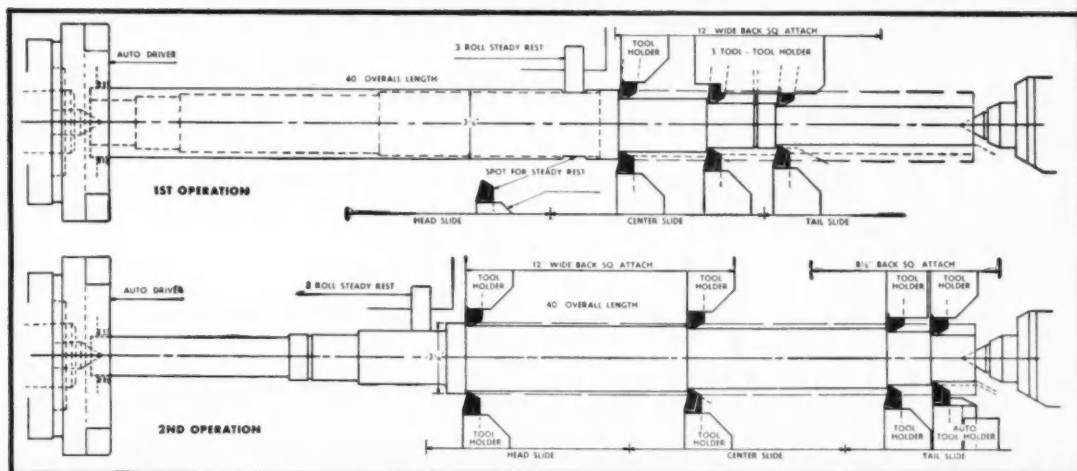


work piece. The lathe is then ready for production.

Tool relief is automatic on the return stroke of the carriage and rapid traverse movements to and from the work are available by throwing a lever.

Investigate the many unique features of this new semi-automatic lathe.

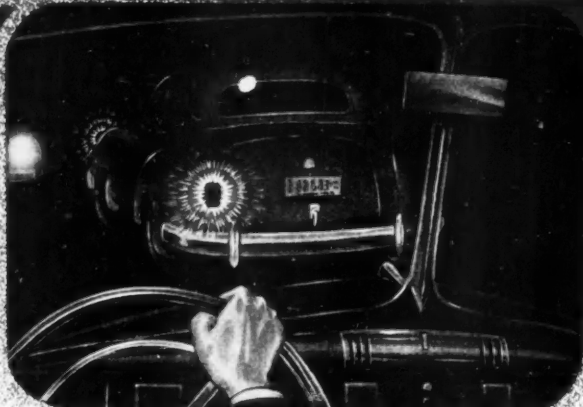
SENECA FALLS MACHINE CO., SENECA FALLS, N. Y.



PRODUCTION COSTS ARE LOWER WITH Lo-swing



Driver of vehicle ahead is about to make a turn. Darkness greatly reduces effectiveness of any hand signal.



Driver indicates left turn with Mitchell directional signal switch. Note flashing rear light. A similar light in front warns approaching car of turn.

install **MITCHELL DIRECTIONAL SIGNAL SWITCH**

give drivers
**FINGER-TIP
TURNING SAFETY**

Mitchell built-in semi-automatic directional signal switch unit for passenger cars.

Mitchell semi-automatic Directional Signal Switch affords motorists an easy, positive method of indicating right or left turns... gives pedestrians and approaching and following vehicles accurate, accident-preventing turning information.

To operate switch driver merely flicks the lever on the steering post, causing an instantaneous, flashing right or left turn signal both front and rear. When turn is completed, signal automatically self-cancels. Switch cannot be burned out by an accidental short circuit.

The Mitchell unit is available in two models. The built-in type is furnished as original equipment on passenger cars; the clamp-on unit is used on buses, trucks and tractors. Models are adaptable to any make vehicle.

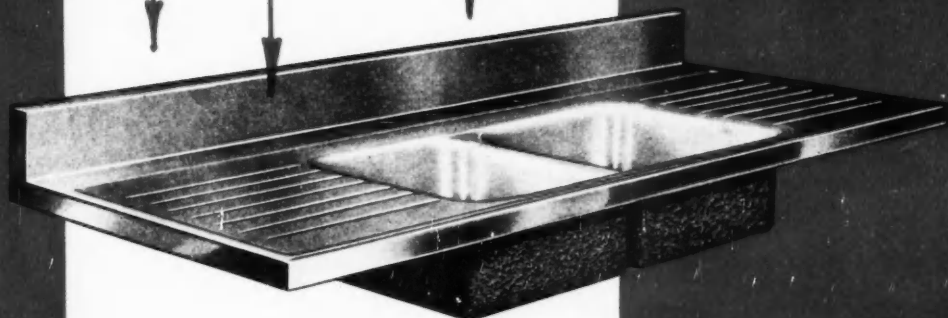
Our sales engineers work with you in the application of Mitchell products to your designs. Call on us at any time.

UNITED SPECIALTIES COMPANY
UNITED AIR CLEANER DIVISION • CHICAGO 28, ILLINOIS—MITCHELL DIVISION • PHILADELPHIA 36, PA.

**AIR CLEANERS ★ METAL STAMPINGS ★ DOVETAILS
★ IGNITION AND DIRECTIONAL SIGNAL SWITCHES ★ ROLLED SHAPES**

Indenting
polished steel sink decks
with a

Special **DANLY DIE SET!**



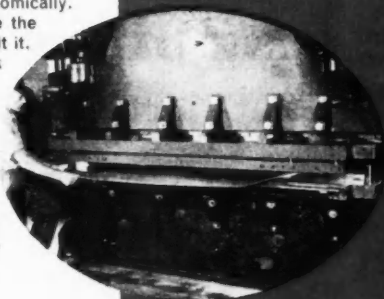
A unique die set installation...

enables Geneva Modern Kitchens, Inc., of Geneva, Illinois to minimize changeover time in stamping a wide variety of sink deck sizes.

For a finish forming operation, production men at Geneva Modern Kitchens, Inc. were faced with the problem of indenting a wide range of sink deck sizes economically. A big precision die set, big enough to handle the largest size, was the answer . . . and Danly built it. With 2½" diameter leader pins and a 3¼" thick shoe, this 112" by 25" special Die Set embodies the precision and accuracy standards of the famous standard Danly Precision Die Sets.

And this is only a single example of how Danly's special facilities can help solve the die and stamping problems that arise in your shop. Take advantage of die set designing and manufacturing experience accumulated in more than 25 years of service to the stamping industry . . . bring your special die set problems to Danly.

Stainless steel sheets are fed by hand. With only simple punches and die changes, this Danly die set accommodates a complete range of required sink deck sizes. Change over time is minimized.



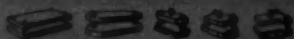
Send for this free bulletin
on Danly's special die set
machining service today!

DANLY

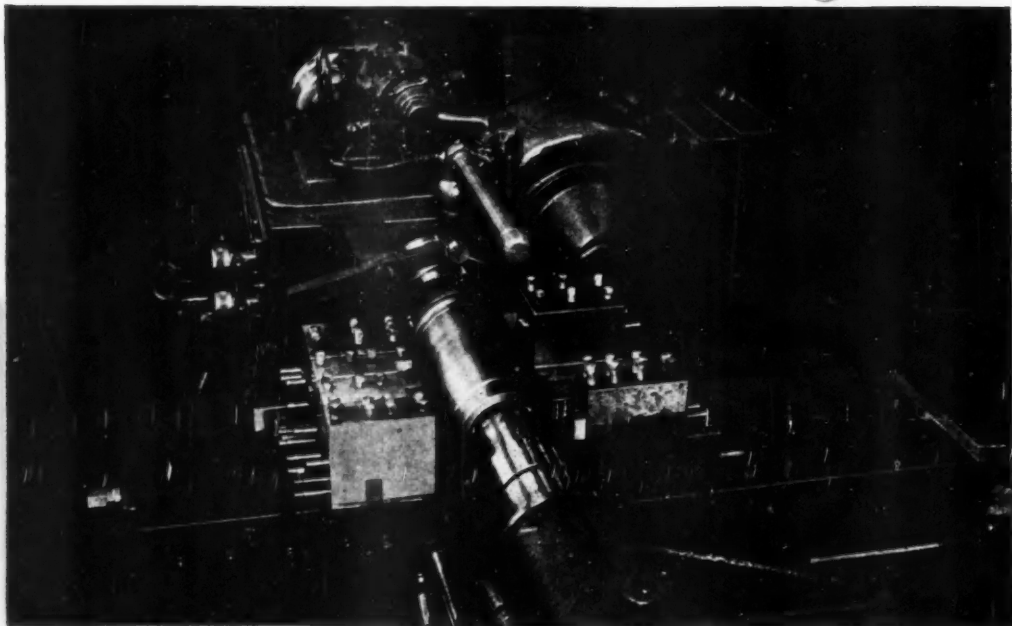
PRECISION DIE SETS . . . Standard and Special

DANLY MACHINE SPECIALTIES, INC.

2100 SOUTH 52nd AVENUE, CHICAGO 50, ILL.



CYLINDER LINERS:



17 different sizes on *One Automatic Lathe* **THE GISHOLT No. 12 HYDRAULIC**

You wouldn't expect an automatic lathe to handle such a wide variety of work as this—unless you know the Gisholt No. 12 Hydraulic.

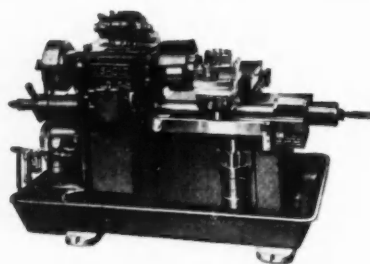
This versatile automatic lathe handles 17 different sizes of cylinder liners ranging from $6\frac{1}{2}$ " to 13" in length and from 3" to 5" in diameter. The work is chucked on expanding arbors with interchangeable

pads, while the front and rear tooling is mounted in standard, interchangeable tool blocks. This arrangement provides exceptional flexibility and a facility to quickly change over from one job to another.

When you can handle as many different sizes of parts on *one* automatic lathe—and cut both machining and set-up time—you're *bound* to cut your costs.

GISHOLT MACHINE COMPANY Madison 10, Wisconsin

Gisholt No. 12 Hydraulic Automatic Lathe—a rugged 12' lathe that combines speed and accuracy with easy set-up—unique among automatics.



THE GISHOLT ROUND TABLE represents the collective experience of specialists in the machining, surface-finishing and balancing of round and partly round parts. Your problems are welcomed here.



TURRET LATHES • AUTOMATIC LATHES • SUPERFINISHERS • BALANCERS • SPECIAL MACHINES

EATON VALVE DEVELOPMENT has Contributed to Higher Efficiency and Longer Life for Engines in Every Type of Service




EATON

MANUFACTURING COMPANY
VALVE DIVISION

9771 French Road • Detroit 13, Michigan

Since the first automotive valves were introduced by this organization in 1911, it has been Eaton's objective to produce valves which would meet the requirements of constantly increasing engine speeds and extreme operating temperatures. Eaton's development of the sodium cooled valve in 1923 represents one of the most important single advancements in the history of aviation. Applying the sodium cooled principle to automotive use, Eaton is contributing thousands of miles of additional life to valves in heavy duty truck and bus service. Equally important advancements have been made in valves for passenger car use—valves which deliver a hundred thousand miles and more of dependable service.



American Quality Springs

*have long been known
for doing the job
dependably—
and economically*

Our engineering staff—our comprehensive production and testing facilities—are at your service to supply you with the American Quality Springs that will do the job for you.

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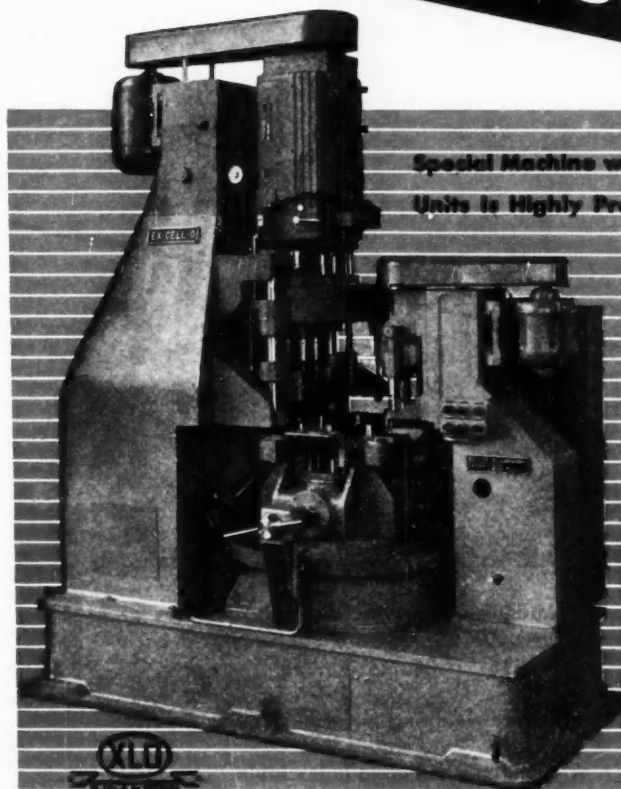


AMERICAN QUALITY SPRINGS

UNITED STATES STEEL

WANT TO **CUT COSTS?**

See **EX-CELL-O**



Special Machine with Ex-Cell-O "Package" Power Units is Highly Productive . . . Low in First Cost!

Ex-Cell-O machines for combined operations save floor space, save handling, save man-hours. When Ex-Cell-O's standard hydraulic power units are used for feeding and rotating the cutting tools, the first cost is low. The Ex-Cell-O special machine shown to the left drills nine holes, reams one hole, and taps three holes in cast iron water pump body at a net rate of two parts per minute! If your production involves operations like this, get in touch with Ex-Cell-O in Detroit today!

EX - CELL - O C O R P O R A T I O N

DETROIT 32, MICHIGAN

Special Multiple Way-Type Precision Boring Machines • Special Multiple Precision Drilling Machines • Precision Boring, Turning, and Facing Machines and Fixtures • Precision Cylinder Boring Machines • Precision Thread Grinding Machines • Precision Lapping Machines • Precision Broach Sharpening Machines • Other Special Purpose Machines • Tool Grinders • Continental Cutting Tools • Broaches and Broach Fixtures • Counterbore Sets • Grinding Spindles Hydraulic Power Units • Drill Jig Bushings • R.R. Pins and Bushings • Fuel Injection Equipment • Dairy Equipment • Aircraft and Miscellaneous Production Parts

Another Special by Cross



Drills, Taps, Reams, and Counterbores Planetary Gear Cage



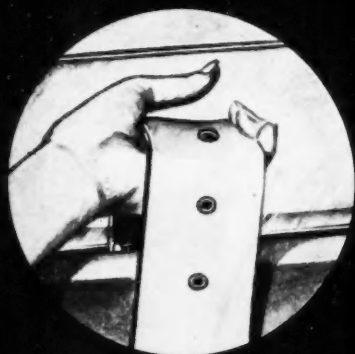
- ★ 75 pieces per hour at 100% efficiency
- ★ Multiple operations on opposite sides of part are handled simultaneously in each station by double loading
- ★ Power clamping for work holding fixtures
- ★ 6-station fluid drive index table

Established 1898

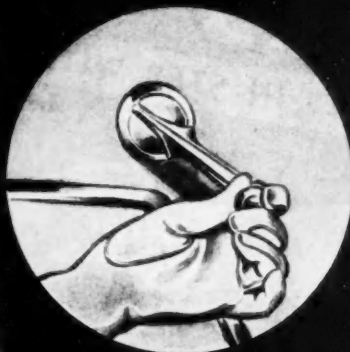
CROSS
THE DETROIT 7, MICHIGAN

SPECIAL MACHINE TOOLS

MILLING • DRILLING • TAPPING • BORING • TURNING • SHAPING • GRINDING • HONING



from this



to this



to this

Window Going Up!

The button-hole strap and roller method of window lift served well enough in its time. But as the automobile outgrew horseless carriage days and demands upon the driver's attention increased, improvements were required. The rack-and-pinion and lazy-tongs types of lift were welcome advancements. The ultimate development—automatic, push-button controlled windows—is an equally natural improvement and is already supplanting manually operated lifts on several makes of cars.

Detroit Harvester is the pioneer in this field. Its Hydro-Lectric system is simple, trouble-free, easily installed,

and so compact as to readily fit body designs. It is now being supplied to motor car manufacturers for use on thousands of vehicles daily.

★ ★ ★

Hydro-Lectric Top, Window, and Seat Control Systems

Convertible Tops • Automobile Body Hardware

Manual Window Regulators • Window Glass Channels

Power Take-Offs • Contract Production Parts

Farm Mowers • Power Sweepers

DETROIT HARVESTER COMPANY

EXECUTIVE OFFICES: 2550 GUARDIAN BUILDING, DETROIT, MICHIGAN

PLANTS: • DETROIT • YPSILANTI • TOLEDO • ZANESVILLE

Bendix Products

KEEPING BRAKES IN STEP WITH MODERN NEEDS



BENDIX* BRAKES

Standard of Safety
Wherever Wheels Turn

For over 20 years Bendix research has been making automotive brakes smoother, safer, and easier to operate. For example, in the Bendix Duo-Servo^{*} Brake the friction of one brake shoe "serves" a second shoe against the drum. The result is a remarkably effective brake that needs only a light pedal pressure. This type of creative engineering, plus mass production know-how, has made Bendix Brakes the standard of safety wherever wheels turn.

A new booklet, "Bendix Duo-Servo Brakes", describes this interesting brake principle. Send for your free copy.

*REG. U. S. PAT. OFF.

BENDIX PRODUCTS

DIVISION of



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AUTOMOTIVE INDUSTRIES



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**AUTOMOTIVE
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The Authoritative Technical and News Magazine
That Gives Comprehensive Coverage, Domestic
and Foreign, of These Industries:

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Truck
Bus
Aircraft
Tractor

Engine
Body
Trailer
Road Machinery
Farm Machinery

Parts and Components
Accessory
Production Equipment
Service Equipment
Maintenance Equipment

High Spots of This Issue

Many Improvements On 1950 Nash Models

Hydra-Matic transmission adopted as optional equipment on Ambassador models, and used in combination with a unique starter control device, headline the news on Nash 1950 models. Other features of interest to engineers and car owners alike are described and illustrated in the article starting on page 24.

Continental's Two Small Aircooled Diesels

Here is publication for the first time the awaited information and specifications on the 2-cyl 9.75 hp and 4-cyl 25.14 hp horizontally-opposed piston, overhead valve engine developed by Continental Aviation and Engineering Corp. for the U. S. Navy. These facts have just been released by permission of the Bureau of Ships. See page 27.

Manifolds, Pistons and Connecting Rods on Oldsmobile's Rocket Engine

This production story gives photographic glimpses into operations at the Oldsmobile Rocket engine plant, with running comment by Detroit Editor Joseph Geschelin on the efficiency with which the equipment turns out manifolds, pistons and connecting rods. Turn to page 28.

Technical Highlights of the 1949 National Air Races

Brisk account of the 1949 National Air Races where new records were established in all major events is here afforded by aviation expert Robert McLarren. Names of pilots, planes, engines, and average speeds attained are also tabulated, beginning page 32.

Magnaflux Inspection Before Machining Saves Costs

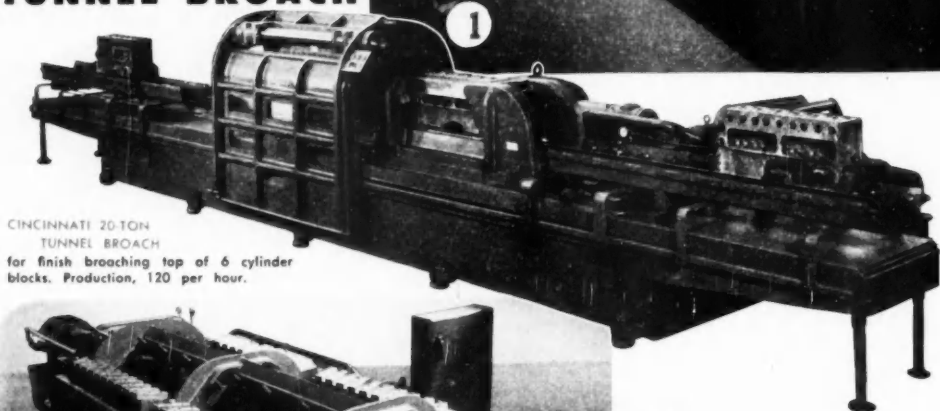
Use of Magnaflux Magnaflux units in non-destructive preventive inspection of rough forgings and castings is described in this article. Its application at Willys-Overland and at Kaiser-Frazer in inspecting connecting rods, steering spindles, spindle supports, steering arms, and cylinder block castings is emphasized, pages 36 and 37.

18 New Product Items And Other High Spots, Such As:

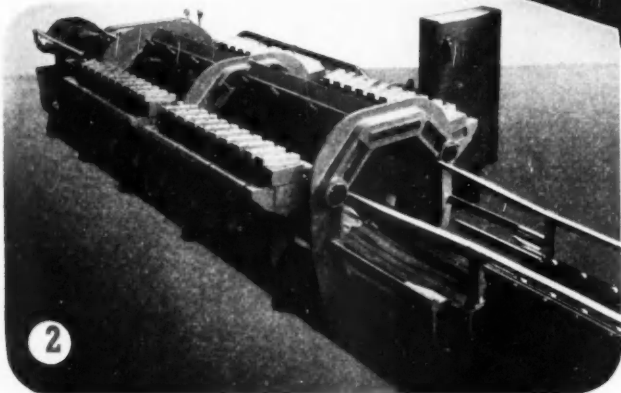
New grid design and casting process which lengthen the life of Gould batteries; centrifugal casting of cylinder sleeves and piston ring pots; the Douglas method of preserving stored tooling; the Chris-Craft outboard motor; design features of Fiat's new Model 1100B; precision casting of hard-to-machine metals with Polystyrene patterns; and a special machine which has an output of 120 exhaust manifolds per hour.

News of the Automotive Industries, Page 17
For Complete Table of Contents, See Page 3

**UP TO
140 QUICK SHAVES
PER HOUR
FOR CYLINDER HEAD FACES
WITH
CINCINNATI
TUNNEL BROACH**



CINCINNATI 20-TON
TUNNEL BROACH
for finish broaching top of 6 cylinder
blocks. Production, 120 per hour.



1 CINCINNATI 10-ton Tunnel Broach. It
broaches two faces of V-8 cylinder blocks, at
the rate of 71 blocks per hour, removing .032"
max. stock each face.



2 Broach holders are hinged to facilitate
removal of inserts when necessary to sharpen
them.

A light skim cut on the faces of cylinder blocks, just before assembly, does wonders in conditioning them for other parts which have been so meticulously prepared. CINCINNATI Tunnel Broaches handle operations of this type at the lowest unit cost. Basically a simple, efficient machine, Tunnel Broaches are integrated with waist-high conveyors on the entrance and exit ends. The ram is hydraulically actuated. It carries the fixture which

holds the work, pushing it under the bank of broach inserts (cutters). A wire cable pulls the finished part onto the exit conveyor as the fixture returns to the loading position, thus making use of the idle time. This is but one of the many examples of Cincinnati ingenuity in low cost broaching. Perhaps our Application Engineers can point out better, lower cost surface finishing methods for your shop. It costs nothing to inquire. Write to Department E.S.

THE CINCINNATI MILLING MACHINE CO.

CINCINNATI 9, OHIO, U. S. A.

MILLING MACHINES • BROACHING MACHINES • CUTTER SHARPENING MACHINES
FLAME HARDENING MACHINES • OPTICAL PROJECTION PROFILE GRINDERS • CUTTING FLUID

NEWS *of the* AUTOMOTIVE INDUSTRIES

Vol. 101, No. 7

October 1, 1949

Vehicle Production Rate Ahead of 1929

Further analysis of comparative production figures between 1929 and the current rate of production indicates that the industry this year should have little trouble exceeding that previous peak year by an easy margin. Factory sales compiled by AMA for the first eight months of this year total 4,230,996 vehicles, compared with 4,224,911 in the first eight months of 1929. Production during the last four months of 1929, however, fell off very sharply to 1,133,509, with December accounting

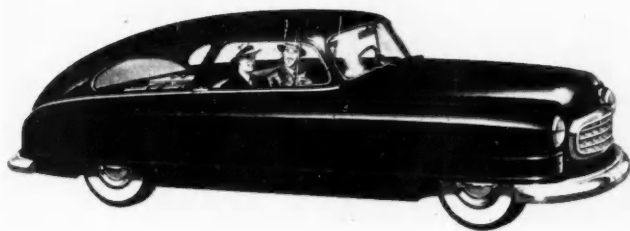
be the New Brunswick foundry. The move is part of an economy drive to lower operating costs. During the first six months of this year, the company had an operating loss of more than \$2.7 million.

Trustees See Little Hope for Tucker Revival

Any hopes that the Tucker Corp. might be revised as a going concern were dashed recently by a report handed in by the trustees appointed by the Federal Court to handle the company's affairs. The report said that be-

Austin Slashes Prices \$225 to \$450

Following in the wake of the announcement of the devaluation of the British pound, the Austin Motor Co., Ltd. (England) has announced a reduction in the prices of its complete line of cars. The price cuts range from \$225 for the A40 Dorset two-door sedan to \$450 for the A90 Atlantic convertible. The New York delivered price of the Dorset, completely equipped and including heater, duty, and Federal tax, is now \$1295; that of the A40 Devon four-door sedan is \$1345; and that of the Atlantic is \$2345. With the devaluation announcement, British car dealers have generally cut prices about an average of 20 per cent.



FLASH FROM NASH

This Airflyte three-passenger business coupe has been added to Nash's 1950 line, which is described on page 24 of this issue. Bumper guards which have been omitted from this photograph are standard on all Airflyte models and are included on the business coupe at no extra cost.

Fruehauf Making New Type Dual-Purpose Trailer

The Fruehauf Trailer Co. has acquired exclusive manufacturing rights to a dual purpose truck-trailer which can be converted in a few minutes from an automobile haulaway unit to a standard freight van. Under an agreement with Evans Products Co., Fruehauf will build and sell the "Tri-Level" trailers, about 100 of which were built by Fruehauf for the patent holder in the past several months. Use of the trailer by operators is expected to extend the scope of operations from automobile assembly plants since it makes possible the reduction or elimination of non-revenue return trips.

Nash Cuts Prices of 1950 Models \$73 to \$140

Nash has cut prices on its 1950 models, introduced to the public Sept. 23rd, by \$73 to \$140. The reduction ranged from approximately 4 per cent to 6 per cent. George W. Mason, Nash president, said that the price cuts were possible because of lower production costs resulting from better availability of materials and elimination of steel ingot conversion costs. He also pointed out that larger volume production and sales have enabled Nash to reduce its unit production costs. Nash also has added a business coupe

for only 120,000. Consequently with the industry planning to build close to 600,000 units in September, production could fall rather sharply the last three months of the year and still reach a new record since only about 550,000 would be needed to pass the 1929 total. A prolonged coal or steel strike of course, could shut the industry down for an indefinite period, but that now appears to be the only means of preventing a new all-time record this year.

Mack Merges Two Plants In Drive for Economy

Mack Engineering Corp. will combine operations for its New Brunswick and Plainfield, N. J., plants within the next six months. The only exception will

cause of the amount of capital required to put the company into operation on a sound basis and the absence of any visible source of such funds, the chances of reviving the company are extremely doubtful. The trustees asked for and received an extension until Oct. 3 for its final report. The report also stated that beginning Nov. 1, the rental fee on the Tucker plant under terms of its lease will be \$2.4 million annually, and that the company is already \$250,000 in arrears in its rent payments. Rental installments due May 1 and Oct. 1 were not made. The trustees also pointed out that \$225,000 would be needed to put the plant in maintenance condition for winter and that there is insufficient cash on hand to justify continued plant maintenance.

NEWS of the AUTOMOTIVE INDUSTRIES

to its 1950 Statesman line, the new name used to designate the smaller of the two series formerly called the 600. The price of the business coupe, according to H. C. Doss, Nash vice-president in charge of sales, is \$1633, \$153 under the lowest-priced 1949 model. The following are factory delivered prices including federal excise tax and dealer handling charges, but with transportation and local or state taxes extra:

	Factory Delivered Price		
	1949	1950	Reduction
Statesman Airflyte	\$	\$	\$
Two-door business coupe	1633	1530	103
Two-door sedan—super	1796	1713	83
Four-door sedan—super	1811	1758	53
Two-door club coupe—super	1808	1732	76
Two-door sedan—custom	1975	1872	103
Four-door sedan—custom	2008	1897	111
Two-door club coupe—custom	1997	1894	103
Ambassador Airflyte			
Two-door sedan—super	2176	2030	146
Four-door sedan—super	2195	2064	131
Two-door club coupe—super	2191	2060	131
Two-door sedan—custom	2318	2198	120
Four-door sedan—custom	2363	2223	140
Two-door club coupe—custom	2359	2219	140

valuable by giving the dealer exclusive selling rights in a designated geographical area. If a dealer's territory were invaded by another GM dealer, the contract provided for a penalty payment by the invading dealer to the holder of the franchise rights in that particular territory. For automobiles, the penalty was a flat sum per car. In the case of Chevrolet, for example, the penalty has been \$35 a car if reported by the invading dealer, or \$55 if not reported and later discovered by the offended dealer or the factory.

In its letter to dealers explaining the move, GM said that it was necessary "in the light of legal trends under anti-trust laws." The letter stated further that in view of a five-to-four Supreme Court opinion in the case of the Standard Oil Co. of California, the revision is being made "to anticipate any further legal attacks on the affect-

equipped next year. The engines will be a modification of the present truck engine.

No ASI Show in Spring of 1950

Presidents of the National Standard Parts Association, Motor and Equipment Manufacturers Association, and Motor and Equipment Wholesalers Association met in New York City on Sept. 22 to decide the time of the next Automotive Service Industries Show. Results indicate that there will be no ASI show in the spring of 1950 due primarily to the conflict with regional shows such as those planned at Los Angeles, Dallas, Houston, and other cities. The presidents have instructed the managers to survey their memberships as to what month during the latter part of 1950 would be the most convenient for the next ASI show.



The Lake City Malleable Co., Cleveland, O., is using this specially built "Salesmobile" to exhibit its products to the public and the industry. The interior view at the right shows the arrangement



ROLLING IN SALES

of some of the products now being displayed in Detroit to the general public, industrial plants, and schools. Lake City Malleable is a large supplier to Detroit's automobile industry.

International Harvester Down for Truck Model Change

All production of International trucks has been suspended since the first week in September for a change-over to a new model to be announced later this year. It now seems evident that the new line will not carry the V-8 engine which the company has had under development for quite some time.

General Motors to Discard "Territorial Protection"

GM will revise its selling agreements with dealers and distributors to eliminate "territorial protection" when new contracts are signed in the next few months. The protection clause, which has been in effect several years, was aimed at making the GM franchise more

ed provisions of the contract regardless of any final decision as to their legality." It is believed that large metropolitan automobile dealers with higher overhead costs will be affected more seriously than small dealerships in outlying areas, since the latter will be able to invade large cities and make better deals because of their lower overhead and selling costs without fear of penalty payments. Most other automobile companies do not have such penalty clauses and those that still have them have not been enforcing them.

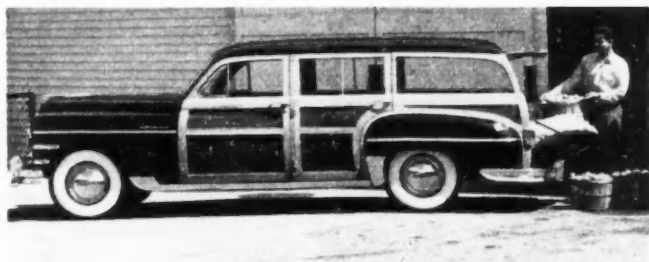
Hydraulic Valve Lifters Slated for Chevrolet

It is reliably reported that Chevrolet will use hydraulic valve lifters in engines used in cars on which the new Chevrolet torque converter will be

FTC to Draft "Anti-Packing" Regulations

The Federal Trade Commission has begun to draft regulations designed to eliminate "packing" of retail automobile sales contracts. The FTC alleges that a number of retail dealers in new and used automobiles are guilty of "gouging" customers by "packing" sales contracts with excessive financing charges. Dealers, on the other hand, maintain that such practices occur only in isolated instances, and that steps are being taken by the industry and by state governments to end such questionable practices. Meanwhile, the FTC is weighing the pro and con arguments presented at a recent public hearing by retailers, financing organizations, and other interested groups. The effective date of the proposed fed-

NEWS of the AUTOMOTIVE INDUSTRIES



BEAUTIFUL UTILITY

Chrysler's first station wagon model since 1941, this nine-passenger Royal station wagon recently went into production at Chrysler plants in Detroit and Los Angeles. Powered by the six-cyl Chrysler Spitfire engine, this model has white ash trim fitted onto steel body panels on the doors and rear quarter sections. These panels are grained to resemble mahogany by a photographic transfer process.

eral regulations still is many months away, however.

Dodge Puts Bonded Brakes on Large Model Trucks

An interesting feature of the new Dodge truck line announced this month is extension of bonded brake linings throughout the line, including the largest models. There has been considerable difference of opinion among engineers about the ability of bonded linings to stand the strain and heat generation of large truck use and the experience by Dodge will be watched closely. The company was the first to use bonded linings on trucks, starting out with its half-ton models. Chevrolet also uses bonded linings on models up to one-ton.

Automobile Companies Shed Steel Operations

With the steel shortage a thing of the past, automobile companies that had acquired steel operations have quietly shed them. Hudson has discontinued operation of its hand mill at New Castle, Pa., and the equipment is for sale. Studebaker is also disposing of its Empire Steel operation, which it acquired during the shortage. Kaiser-Frazer more than a year ago disposed of its Chapman-Price steel mill in Indianapolis, and also has sold its Phoenixville, Pa. operation. Borg-Warner Corp. has sold its Superior Sheet Steel Div. mill in Canton, O.

Mark Made Controller of General Motors

Ralph C. Mark, formerly director of the cost analysis section for GM, has

been elected controller of the corporation. He succeeds the late R. E. Hammond. GM has also announced the appointment of Richard C. Gerstenberg as assistant controller. He had been a director of the operations analysis section on the controller's staff since 1947.

SAE Chooses Vanderbilt as Beecroft Lecturer

Chief Justice Arthur T. Vanderbilt of the Supreme Court of the State of New Jersey has been chosen as the Third David Beecroft Memorial Lecturer by the Society of Automotive Engineers. The jurist was selected to present this lecture Oct. 20 in New

York City, because of his "substantial contributions to safety of highway traffic" in the field of traffic laws and their enforcement.

Nash 1950 Tooling Cost \$1.7 Million

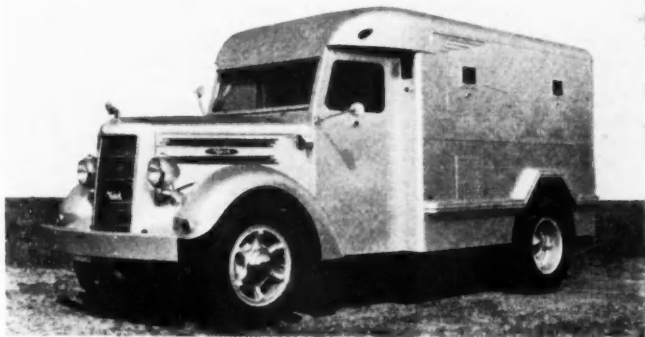
Nash spent about \$1.7 million for tooling for its changeover to 1950 models which were announced to the public Sept. 23. Expenditures for new machine tools and special plant equipment for engine changes alone amounted to \$275,000.

Car Registrations and Travel To Smash All Records

Motor vehicle registrations and the volume of highway travel in the United States will exceed all previous records, according to preliminary estimates of the Bureau of Public Roads. Total registrations are expected to reach a new high of approximately 43,298,000 vehicles, an increase of 2,675,736 over the 40,622,264 privately-owned and commercial vehicles registered last year. Government-owned equipment will add more than 500,000 additional vehicles to the total.

Industry Refutes Report of "Phantom" Tool Orders

There is no such thing as "phantom" orders in the machine tool industry, according to L. D. MacDonald,



COMFORTABLE SECURITY

Recently shipped to Cuba's Treasury Dept., this Mack model EE armored truck, specially designed for comfort and maximum security, is constructed of aluminum over an all-steel frame. The inside body walls are Alcoa Dural 24-ST aluminum armor plate. The gasoline tank is protected by aluminum armor plate, and windshield and windows are bulletproof glass.

NEWS of the AUTOMOTIVE INDUSTRIES

NEW TRUCK REGISTRATIONS*

Arranged by Makes in Descending Order According to the Seven Months' Totals

MAKE	SEVEN MONTHS						
	Units			Per Cent of Total			
	July 1949	June 1949	July 1948	1949	1948	1949	1948
Chevrolet	28,256	30,559	25,540	200,766	179,826	37.02	28.61
Ford	14,968	12,975	22,935	97,072	141,787	17.90	22.56
Dodge	9,189	10,227	9,558	67,200	86,744	12.39	10.62
International	7,385	7,169	11,830	52,670	82,096	9.71	13.06
G.M.C.	7,127	7,820	6,181	46,655	40,703	8.60	6.48
Studebaker	4,885	4,953	5,296	33,117	28,820	6.11	4.59
Willys-Truck	1,306	1,223	3,027	12,682	18,945	2.33	2.54
Willys-Jeep	1,096	1,185	4,940	9,791	30,188	1.81	4.80
White	626	680	910	4,822	7,299	.89	1.16
Mack	524	483	848	3,568	6,374	.66	1.01
Diamond T	347	401	1,069	3,296	6,631	.61	1.05
Reo	228	291	1,012	2,397	7,297	.44	1.16
Divco	279	337	420	2,182	3,863	.40	.58
Autocar	108	106	227	1,052	1,684	.19	.27
Brookway	113	87	201	866	1,881	.16	.30
Federal	61	91	334	805	2,940	.15	.47
Crosley	44	80	203	629	1,621	.12	.26
Pontiac	37	52	253	253	243	.04	.04
Kenworth	34	45	38	243	243	.04	.04
F. W. D.	20	15	175	214	606	.04	.10
Sterling	22	34	38	145	284	.03	.04
All Others	211	216	275	1,878	1,921	.35	.30
Total	76,666	79,069	94,036	542,292	628,553	100.00	100.00

* Based on data from R. L. Polk & Co.

president of the National Machine Tool Association, and vice president of Warner & Swasey. He points out that recent rumors about putting such "phantom" machine tool orders into production to aid employment in distressed areas are of unknown origin and are completely without foundation. He states that there are emergency production schedules which could be activated immediately in case of war, but to do so now would only add to the stockpile of government-owned machines, and would have little immediate effect on employment since it would take from

six months to a year to get up to the scheduled rate of operations. He pointed out that a more constructive means of aiding the industry and the economy would be liberalization of tax policies with respect to depreciation on machine tools.

To Hold Grand Canyon Run in February 1950

Plans for the 1950 Mobilgas Grand Canyon run, world's largest stock car and mileage test, have been announced

by the General Petroleum Corp., sponsors of the event. The 751-mile run, scheduled to take place February 15-16, 1950, is under the supervision and sanction of the Automobile Association of America. Starting at Los Angeles, the course runs through Death Valley to Las Vegas, Nev., where the contestants will spend the night. The next morning they will drive to the finish at Grand Canyon. A minimum of 25 cars will participate.

Willys Delays Date of "Dealer Day"

Willys-Overland has delayed its "Dealer Day" at Toledo, originally scheduled for Oct. 7, to an indefinite future date. The delay was recommended by Willys dealers on the grounds that it would upset the fall sales campaign which began early in September.

Legislatures Liberalize Laws on Truck Weight & Length

A review of legislation for the past three years shows that considerable progress is being made in allowable length and weight limitations for trucks and trailers. William Wise, advertising manager, Fruehauf Trailer Co., recently compiled a list of changes from Jan. 1, 1945 to Mar. 15 of this year showing that 23 states have increased allowable overall length from an average of 41 ft to an average of 49 ft, or an increase of 20 per cent. He also found that during the same period, 28 states have boosted gross weight limits from an average of 43,422 lb to an average of 59,508 lb, or an increase of 37 per cent.

Vehicle Output Dependent on Vendors' Steel Supply

While it is true that automobile manufacturers made intensive efforts to increase their supplies of steel on hand in expectation of a steel strike, the big question mark as to how long continued operations could be sustained is the amount of steel in the hands of suppliers. During the shortage of steel, major manufacturers furnished suppliers with at least part of their requirements, but when the supply eased about the first of June the suppliers were left pretty much on their own. It is reported that many of them did not attempt to stock up since they were not anxious to tie up capital in inventory. Undoubtedly the manufacturers could again dip into their own supplies to furnish steel to suppliers, but it would

NEW PASSENGER CAR REGISTRATIONS*

Arranged by Makes in Descending Order According to the Seven Months' Totals

MAKE	SEVEN MONTHS						
	Units			Per Cent of Total			
	July 1949	June 1949	July 1948	1949	1948	1949	1948
Chevrolet	106,443	110,078	51,321	540,542	408,934	20.71	20.86
Ford	70,887	42,420	39,104	418,004	215,502	16.05	10.99
Plymouth	45,071	46,864	31,649	279,698	189,204	10.68	9.65
Buick	31,432	35,798	18,565	212,578	145,192	8.14	7.40
Pontiac	30,488	31,858	16,127	171,293	133,651	6.56	6.82
Oldsmobile	24,931	25,876	12,724	147,066	108,238	5.64	5.38
Dodge	26,833	23,262	19,163	133,346	123,330	5.11	6.29
Studebaker	19,617	20,312	13,231	109,876	86,166	4.21	4.39
Mercury	16,060	10,806	13,068	83,720	64,173	3.59	3.27
Huilton	12,293	15,103	10,497	69,479	69,505	3.43	3.54
Nash	13,551	12,862	9,735	78,361	71,354	3.00	3.64
Chrysler	11,175	11,277	9,785	69,704	60,283	2.67	3.07
Packard	9,267	10,064	7,380	57,717	48,539	2.21	2.32
De Soto	8,703	9,994	7,294	55,624	46,313	2.13	2.38
Cadillac	6,621	7,433	5,189	47,266	32,556	1.81	1.66
Kaiser	6,595	7,896	10,665	37,847	66,884	1.45	3.40
Lincoln	2,589	2,708	3,967	22,723	16,007	.87	.82
Willys	2,911	2,902	754	16,746	14,476	.74	.74
Frazer	1,191	1,599	5,407	12,527	41,699	.48	2.13
Crosley	757	879	2,680	6,917	16,161	.26	.82
British Ford	414	679	337	4,095	637	.16	.03
Austin	262	327	1,012	1,815	5,513	.07	.25
All Others	380	351	612	3,327	2,738	.13	.15
Total	448,477	432,470	291,206	2,610,093	1,960,734	100.00	100.00

* Based on data from R. L. Polk & Co.

NEWS of the AUTOMOTIVE INDUSTRIES

cut down the length of time that they could continue to operate. The general opinion is that plants have enough steel so that they could operate from three weeks to a couple of months depending upon the particular company, but that estimate presupposes no breaks in the chain of supply from vendors. Prolonged strikes in either the coal or steel industries, however, would certainly shut down the industry within a matter of a few weeks.

Method Developed to Cut Brake Bonding Time

A new high speed method of curing bonded brake linings electrically is reported to have been developed by a newly-formed Ohio company. It is understood that the process has been offered to several automobile manufacturers now using bonded brakes and to large brake suppliers. Details are not available for publication, but it is said that the development promises marked savings in processing time and equipment costs. Under methods currently in use, curing the linings in large ovens requires from 25 to 50 minutes in the production cycle.

Continental Motors Earnings Decline

Earnings of Continental Motors Corp. and subsidiaries for the nine months' period ended July 31 this year totaled \$1,701,005, compared with \$2,536,129 in the same period a year ago. Inventories were reported down 22 per cent under last year, and working capital is up \$1.2 million to more than \$21.8 million.

Award 1948 SAE Manly Memorial Medal to Kalitinsky

Andrew Kalitinsky, chief engineer of the NEPA Div., Fairchild Engine & Airplane Corp., Oak Ridge, Tenn., will be awarded the 1948 Manly Memorial Medal of the Society of Automotive Engineers on Oct. 7, during the three-day SAE National Aeronautic Meeting in Los Angeles. The meeting is scheduled for Oct. 5-7.

1950 Motor Boat Show in NYC from Jan. 6 to 14

The 1950 National Motor Boat Show, sponsored by the National Association of Engine and Boat Manufacturers, will be held in New York City from Jan. 6, with the exception of Jan. 8, to Jan. 14.

GMC Delays Production of New Large Engine

GMC Truck & Coach has delayed for an indefinite time the start of production on its new 707 series 225-hp gasoline engine. The tooling has been completed, however, so that the engine could be put into production on short notice. Originally it was planned to start production in October or November to provide a companion gasoline engine for the company's 200-hp Diesel model. Development is still going on with the 300-hp aluminum Diesel engine, but it appears to be a long time away.

and that an active evening car lot should prove a great benefit in reducing used car stocks.

Used Car Dealers Elect New Officers

Delegates to the National Used Car Dealers Association convention held in Detroit in September elected Martin McCollum, Flint, Mich., as president and selected Dallas, Tex., as the site for the next convention. Other officials elected were Edward A. Addison, Chicago, first vice president; James Downing, Atlanta, secretary; Lewis Baker,



MAKES A THIRD

Supplementing two F-3 parcel delivery chassis (see page 39, Dec. 1, 1948, *AUTOMOTIVE INDUSTRIES*), this new heavy-duty Ford F-5 forward control parcel delivery chassis, with 134-in. wheelbase, will accommodate 10 1/2 to 12 1/2 ft delivery bodies. Now being made on special order, it is powered by the Rouge 226 Ford six-cyl truck engine which develops 95 hp.

Chevrolet Dealers Respond to Used Car Sales Plan

Chevrolet dealers have already ordered more than \$1.5 million worth of equipment under the Chevrolet used car and truck program. The program was first announced nationally about six weeks ago. Chief purpose of the used car program is to put merchandising on a sound uniform basis by helping dealers to modernize car lots and sales methods. The company is especially encouraged by the dealers' acceptance of suggested new lighting fixtures since preliminary studies made by Chevrolet showed that half of all used car sales are made after dark

Providence, treasurer; and Carl Marker, Fort Wayne, honorary president. The convention went on record as willing to cooperate with FTC on automobile sales and financing rules as long as they are consistent with the public interest and existing laws. The convention this year was marked by much lower attendance and a greater amount of dissension over policy than was evident in the previous two years when the used car business was flourishing. The association is now going through a shaking down and reorganization period, according to leaders in the organization, but determined steps will be taken to strengthen and unify the membership.

NEWS of the AUTOMOTIVE INDUSTRIES



BE SEATED!

Offered on GMC Truck & Coach 700-980 conventional models as well as all heavy duty COE models (described on page 30, June 1, AUTOMOTIVE INDUSTRIES), the new GMC cab's single passenger seat installation is shown at the left, while the two-passenger seat is shown at the right. One of the most significant improvements offered in the new GMC H line truck models is the short front-bumper-to-rear-of-cab dimension provided by the Diesel-powered units of the 900 series. This dimension now 117 in. was formerly 130 3/4 in., and thus permits a 13 3/4-in. increase in the length of the truck back of the cab.

GM Appoints Conlon Ternstedt Manager

James L. Conlon has been appointed general manager of GM's Ternstedt Div. to succeed John W. Jackson now on leave of absence. Mr. Conlon had been resident manager of the Ternstedt plant in Columbus since operations began there in Sept., 1946. He has assumed his new duties with headquarters in Detroit. Paul L. Jones, previously works manager at the Columbus plant, has been named resident manager there to succeed Mr. Conlon.

To Open Second Car Assembly Plant in India

With an expected annual production capacity of 2000 cars, a second automobile assembly factory is to be opened in Madras Province, India. Now nearing completion, the first factory at Ennore, 15 miles north of Madras, is expected to assemble 5000 cars annually.

New Reo Engine Shows Long Range Planning

Further information on the new Reo overhead valve truck engine points up the company's long range planning. Originally it was thought that the engine might be used for export purposes, and it is said to be designed so that it could be used as a Diesel by use of

an injection system and suitable cylinder head. With the trend toward high compression ratios, the new engine will also be adaptable to go as high as seems likely in the foreseeable future, since it has been tested experimentally as a Diesel with compression ratios of 12.5 to 1. R. D. Hilty, Reo sales manager, says that for \$95 the owner can buy six complete cylinder assemblies consisting of sleeves, pistons, pins, and

rings which because of the engine's construction can be installed without removing it from the chassis.

Martin Unveils New Tri-Jet Bomber

A new high-speed ground-support bomber identified so far only as the Martin XB-51 has been built by the Glenn L. Martin Co. The XB-51 is the first postwar airplane specifically designed for the destruction of surface targets in cooperation with the Army Ground Forces. Powered by three turbo-jet engines, two mounted on pylons on the lower sides of the fuselage near the cockpit with the third in the rear of the fuselage, the XB-51 is the Air Force's first three-jet airplane. The thin, high-speed wings of the XB-51 are swept back at an angle of 35 deg. and have a span of approximately 55 ft. The fuselage is approximately 80 ft.

Nash Abandons Plans for Medium Truck

Plans for Nash to build a 1 1/2-ton truck have been washed out, at least so far as the domestic market is concerned. However, there are good prospects that a pick-up truck may be offered and engineering on such a unit has been completed. Nash dealers would like to have some kind of truck in their line, it is reported. If and when the pick-up truck is offered, the buyer will probably have an option as to whether he will take the smaller 85-hp 600 engine or the larger overhead valve type Ambassador engine, which develops 115 hp.

1949 MOTOR VEHICLE FACTORY SALES FROM U. S. PLANTS*

				Totals	
	Passenger Cars	Trucks	Buses	1949	1948
January	326,019	104,599	658	431,276	405,683
February	324,547	101,700	418	426,665	383,002
March	402,402	115,171	545	518,118	492,034
April	436,352	106,212	514	543,118	438,090
May	394,703	86,200	564	481,467	338,638
June	493,082	99,126	632	593,640	431,046
July	483,281	93,348	438	577,067	474,556
August	557,370	99,850	444	657,664	461,353
Total Eight Months	3,418,576	806,206	4,214	4,230,996	3,424,282

1949 FACTORY SALES TO DOMESTIC AND FOREIGN MARKETS*

	Passenger Cars		Trucks		Buses	
	Domestic	Foreign	Domestic	Foreign	Domestic	Foreign
January	312,199	13,820	91,282	13,317	618	40
February	310,343	14,204	86,540	13,160	326	82
March	385,634	16,568	96,825	15,246	423	122
April	422,149	14,243	91,806	14,404	494	26
May	380,489	14,214	75,518	10,662	611	63
June	480,009	13,873	89,174	9,852	522	110
July	471,752	11,509	85,427	9,921	396	46
August	544,630	12,740	99,969	9,661	420	24
Total Eight Months	3,307,405	111,171	711,663	96,543	3,713	501

* Data from Automobile Manufacturers Association.

NEWS of the AUTOMOTIVE INDUSTRIES

Ford Makes Simpson Head of Parts Manufacturing

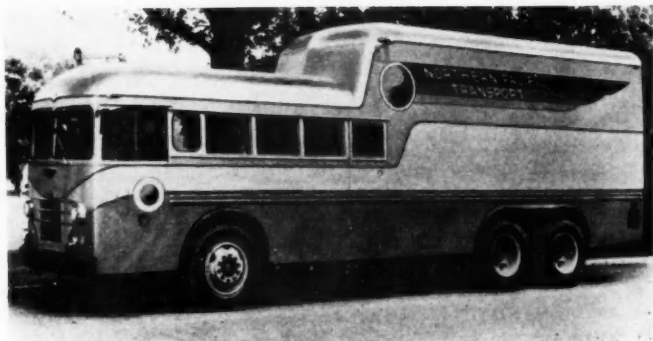
Walter H. Simpson has been appointed general manager of Ford Motor Co.'s parts and equipment manufacturing division at Ypsilanti, Mich. He succeeds Roscoe M. Smith who was made director of quality control for Ford in July. Mr. Simpson had been assistant general manager of the division, which consists of ten plants located in Michigan communities and at Green Island, N. Y., and Hamilton, O.

Willard Develops New Heavy Duty Battery

Willard Storage Battery Co. is in production of a new type battery which the company says will provide starting power for tanks, trucks and buses in temperatures as low as -65 F. The battery may also be used for highly specialized civilian applications as well as military operations. A feature of the battery is the thin plate construction which with no sacrifice in strength permits the use of many more plates, and consequently greater plate area.

Glidden Tour Held in September

About 70 antique automobile enthusiasts drove their old cars over the 650-mile route of the 1949 revival of the early Glidden Automobile Tours from Sept. 25-30. Passing through sections of Pennsylvania, West Virginia, Vir-



TWO FOR THE PRICE OF ONE

This combination truck and bus six-wheel unit was recently delivered by the Kenworth Motor Truck Corp. to Northern Pacific Transport Co., and is being operated out of Billings, Mont. It accommodates 17 passengers and provides freight carrying space of 18 by 8 ft. The original idea is credited to F. R. Meehan, Northern Pacific Transport superintendent. Developed by Kenworth engineers, it is equipped with a Hall-Scott engine.

ginia, Maryland and Delaware, this year's revival tour was sponsored by the Antique Automobile Club of America and the Veteran Motor Car Club of America in cooperation with the American Automobile Association.

Nash Retires Its Loan Four Years Early

The Nash-Kelvinator Corp. has made the last payment four years ahead of time on a long-term bank loan made in early 1945. The original loan was \$16

million and was made to provide increased working capital for reconversion after the war. Four annual payments of \$2 million each had been made on the loan and the remaining \$8 million was paid off on Sept. 27 of this year. With repayment of the loan, Nash-Kelvinator now has a funded debt of about \$20 million on which the first installment of \$2 million will not be due for five years.

Truck Operators Opposed to Builders' GVW Ratings

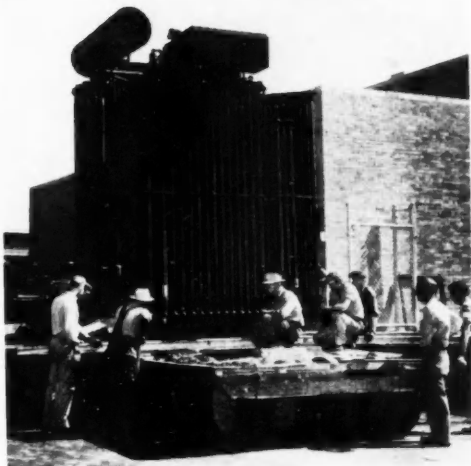
Details of a voluntary agreement worked out by steel haulers and truck and trailer manufacturers revealed how deep seated is the opposition of truck operators to GVW ratings imposed by manufacturers. The haulers rejected a proposal to use GVW as a measure of load limitation, and instead adopted a standard of 125 per cent of tire capacity on the tractor and 135 per cent of tire capacity on trailers. Under the new rules, effective Nov. 1, each vehicle or combination will be marked with its allowable weight designation and steel companies will not permit unmarked or overloaded trucks to move steel from their plants.

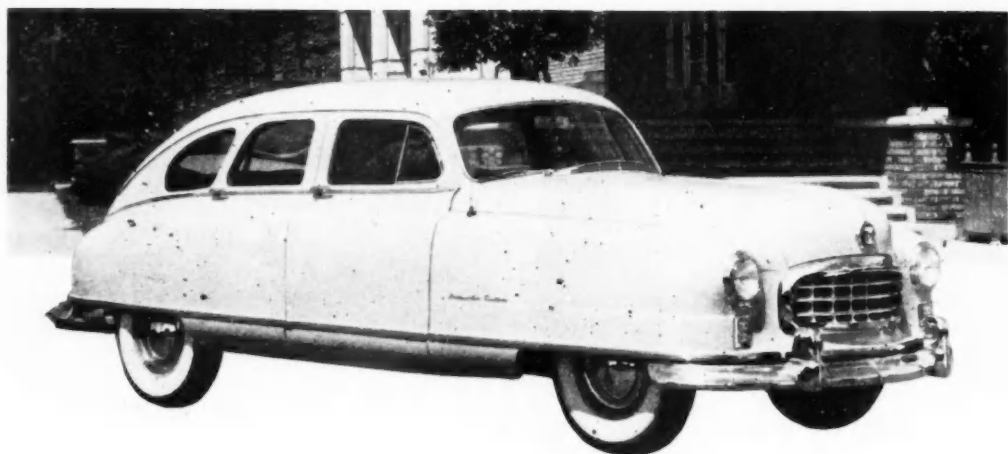
Standard Products Opens New Plant in California

The Standard Products Co. is opening a plant at Long Beach, Calif., to supply glass run window channels and contour weatherstripping for Ford Motor Co.'s assembly plants.

LOTS OF WATTS

Weighing 21 tons, this 5000 k.w. electrical transformer is one of two giant units recently installed on GM's Oldsmobile Div. property to supply power for the Rocket engine plant. The two big transformers are owned by the Lansing (Mich.) Board of Water and Light Commissioners.





The 1950 Nash series includes the Statesman and Ambassador models in two- and four-door sedans and club coupes. Features are fully-enclosed front fenders, passenger compartments over nine ft long, and redesigned curved instrument panels.

Many Improvements On

HEADLINING the features of 1950 Nash cars is the adoption of the Hydra-Matic transmission as optional equipment on Ambassador models, used in combination with a unique starter control device developed by Nash. Fresh interior styling, built-in twin beds, and adjustable reclining seats combine with numerous mechanical features to make the new models of interest to engineers and car owners alike.

Two lines are offered, in standard-priced Super and higher-priced Custom models with two- and four-door sedans as well as a club coupe in all lines and models. The Ambassador designation is retained for the higher priced cars while the former "600" identification is replaced by the Statesman as of 1950 models. Wheelbase remains the same—112 in. on the Statesman and 121 in. on the Ambassador—while major dimensions of the body also remain unchanged.

Of the mechanical features, it is significant that important detail engine changes have been employed to exploit all-around performance rather than peak output. In fact, the top horsepower and torque are changed only slightly. Both engines are fitted with T-P "U-Flex" piston ring for the lower oil control ring, although Nash calls this the "Seal-Flex" ring. On the Ambassador engine compression ratio has been

Hydra-Matic Transmission and Unique Starter Control Device Are Optional Equipment on Ambassador Models. Among Other Features Are Larger L-Head Engine, Improved Overhead-Valve Engine, and Optional Reclining Right Front Seat. Statesman Is New Name for "600"

increased to 7.3 to 1 from the former 7 to 1. This has brought with it a new cylinder head having advanced combustion chamber design, permitting an increase in compression ratio without greater tendency to knock. It is designed to run on regular gasoline.

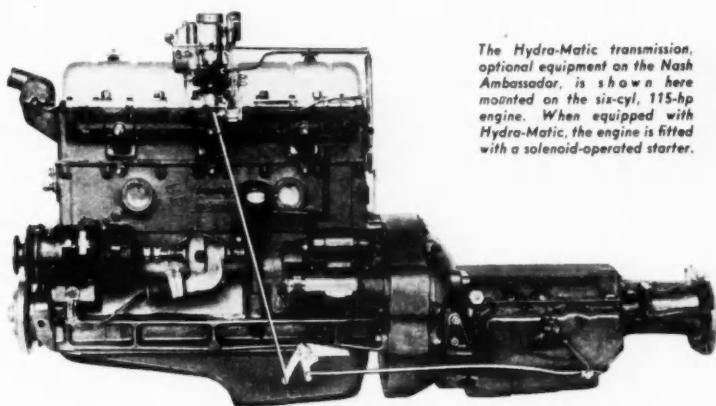
Valves in the new head are inclined 11 deg from the vertical and valve stems and tips are made harder by using welded-on tips and by increasing the carbon content of valve stems. Exhaust valve lash on Ambassador engines is changed from 0.015 to 0.018 in. to improve idle in hot weather.

Overhead valve lubrication has been simplified and improved by feeding oil under pressure through the hollow rocker arm shaft directly to each rocker arm bearing. The felt wicks formerly used have been eliminated. Oil to the ends of the rocker arms is fed through a metering hole in the top at the shaft bearing. The rocker arm forgings are so shaped as to prevent excess oil from running down to the valve stems. In addition, a baffle inside the cover shields the valve

area. Rubber seals on valve stems at the spring retainer afford a further guard against seepage of oil.

It is of interest that with the above changes in the lubricating system, the oil filter has been dropped as standard equipment on the Ambassador.

Some detail changes have been made in the crankshaft and flywheel assembly for the Ambassador engine when Hydra-Matic drive is specified. The crankshaft is of seven-bearing type as before but it has solid crankpins and heavier counterweights. Instead of the conventional



The Hydra-Matic transmission, optional equipment on the Nash Ambassador, is shown here mounted on the six-cyl, 115-hp engine. When equipped with Hydra-Matic, the engine is fitted with a solenoid-operated starter.

the pressure exerted in a downward direction.

Adoption of Hydra-Matic drive has brought with it numerous changes in mechanical features in the Ambassador chassis. For one thing a new rear housing is required to accommodate the torque tube drive hook-up and one new exterior control lever is needed. Rear axle ratio is 3.54 to 1 instead of the standard ratio of 4.1 to 1 supplied with the conventional transmission.

Another major change is found in the throttle linkage. While the connection between the accelerator pedal and carburetor remains about the same, added linkage is required between carburetor and transmission to provide the torque sensitivity which varies the shift speeds depending upon accelerator pedal position and engine torque.

Other detail changes are made to accommodate the Hydra-Matic drive. The body floor has been altered to provide clearance with the case. A removable cover

1950 Nash Models

flywheel, the shaft is fitted with a stamped flywheel having ring gear teeth cut directly on the periphery. The 1950 crankshaft for Hydra-Matic jobs is balanced separately, then rebalanced after the flywheel is assembled.

Introduced late in the 1949 run Ambassador is a new vertical tube radiator, replacing the former cross-flow type. It is used in conjunction with a flexible curved upper radiator hose having a thermostat housing outlet at the side. This eliminates two rubber hose connections. The capsule-actuated thermostat adopted last year has been changed to a 170-deg setting from 165 deg to improve operation of the Weather Eye. This feature is common to all models.

Major change on the Statesman engine (former 600) is an increase of $\frac{1}{4}$ in. in stroke, a corresponding increase in displacement, and a consequent change in the crankshaft, pistons, and cylinder head. Compression ratio remains the same and the gain in displacement is reflected in improved all-around performance and by an additional three horsepower in the peak output of the engine.

Mufflers for 1950 are of straight-through type with tuning chambers surrounding the central tube. This is said to result in lower back pressure and reduced radiation.

Battery mounting on the Ambassador has been improved by use of a new heat shield between the battery and engine. The shield is a part of the new battery holddown which clamps the entire top of the case with

Condensed Specifications of Nash Engines

Type	Ambassador Valve-in-head	Statesman L-head
No. cyl.	6	6
Bore	3 $\frac{3}{4}$	3 $\frac{1}{8}$
Stroke	4 $\frac{1}{2}$	4
Displacement	234.8	184
Compression ratio	7.3 to 1	7 to 1
Bhp (max.)	115 @ 3400 rpm	85 @ 3800 rpm
No. main bearings	7	4
No. piston rings	4	4

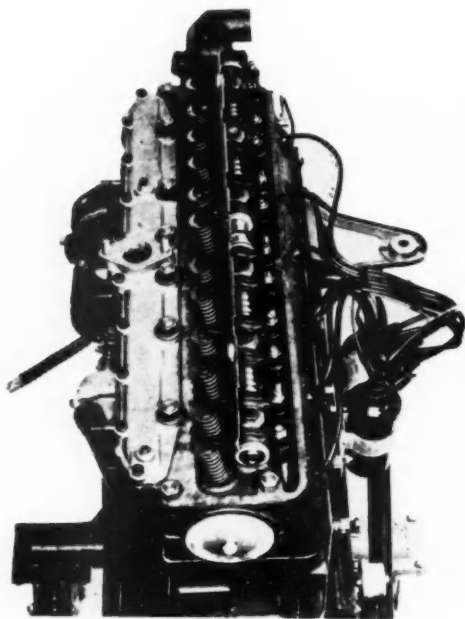
provides access to the unit for band adjustments. The fast idle cam on the carburetor has been altered for more accurate control of idle speed at warm-up, also reducing tendency to creep. The carburetor throttle plate is permitted to swing about four degrees past center at wide open to permit full throttle opening prior to the kick-down shift.

The forward end of the propeller shaft is made of tubular section to increase stiffness and reduce noise at low speeds under certain conditions. Propeller shaft and torque tube are several inches longer than in 1949 since Hydra-Matic is shorter than the conventional transmission with overdrive. However, the 1949 length propeller shaft is used in 1950 models with the conventional transmission with overdrive.

With Hydra-Matic Nash supplies a new type of starter mechanism which is actuated by lifting the direction control lever. Developed by Nash, it is considered faster and more convenient than the conventional dash-mounted push button. The starter solenoid used with this device is similar to those used by other manufacturers. The starting motor differs from Nash practice, the solenoid, mounted on top of the starter housing, being used not only for closing the electrical contacts but also to engage the starter gear. With this arrangement teeth are engaged before the contacts are closed. An overrunning clutch on the starter pinion prevents excessive speed of the starter armature when the engine picks up speed.

The Statesman and overdrive equipped Ambassadors continue use of the clutch-pedal actuated switch and Bendix starter drive.

On conventional models Nash continues its three-speed synchromesh transmission with overdrive offered on the Ambassador as well as Statesman models. Overdrive cut-in speed is reduced to 25 mph on both models. Standard rear axle on Ambassador remains 4.1 to 1 but has been changed to 4.375 to 1 on the Statesman. With overdrive Ambassador becomes 4.44 to 1 while the Statesman is made 4.875 to 1.



Top of Nash 1950 Ambassador engine with valve cover removed. Valves are inclined 11 deg from the vertical and a shield over the rocker arms reduces the amount of oil reaching valve stems.

From the standpoint of exterior styling 1950 models have wider rear window, heavier bumper guards, and enclosed gas tank filler.

Interior treatment has been revised extensively in upholstery treatment and in many other details. Weather Eye changes have been made to improve the effectiveness of the defroster. Heater control has been simplified by using only one knob, rotated to turn on the defroster and heater fans, pulled to adjust the thermostat.

An important sales feature is found in a newly developed reclining back on the right front seat back. This is available as an extra-cost factory-installed option.

A number of miscellaneous changes have been made in the interest of manufacturing or service. Steering linkage on the Ambassador is revised to provide

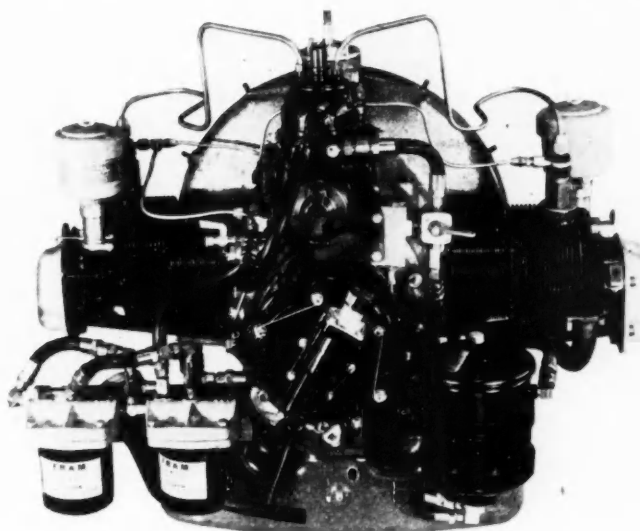
more accurate control when front wheels are deflected vertically on rough roads. The steering column has been lengthened to raise the steering wheel by $\frac{3}{4}$ -in. to provide room for the Hydra-Matic quadrant and indicator. The Uniscope shroud is slightly shorter for the same reason. The Uniscope housing is shorter to provide more clearance for servicing while its interior construction has been changed to reduce the bend in the speedometer cable.

Access holes are provided in the trunk floor for the fuel gage tank unit, making it unnecessary to remove the tank to reach this unit. Another access plate is in the body floor over the Hydra-Matic transmission to permit checking the pressure regulator or adjusting bands, and to facilitate servicing or removal of the transmission. A smaller access hole permits checking the oil level of the Hydra-Matic.

Insulation across the front of the passenger compartment is of Fiberglas.

In addition to the foregoing changes in design, some features which were adopted late in the 1949 run of cars are continued on the 1950 models. Among these developments is a new camshaft in the Ambassador engine with an improved cam contour designed to provide better all-around engine performance and quieter running. Valve timing also was changed.

Continental Develops Two Small, Aircooled Diesels



View of two-cylinder Continental aircooled Diesel engine with shields removed to show flywheel housing and plumbing to and from the Bosch fuel pump. The Fram fuel filters are seen at the left; the lube oil filter is at the right.

WHILE an aircooled Diesel engine is sufficiently unique in American practice to warrant attention on the part of designers and users alike, it is particularly true of small engines such as the 2-cyl, 9.75 hp and 4-cyl, 25.14 hp horizontally-opposed piston, overhead valve engines developed by Continental Aviation and Engineering Corp., and described in this AUTOMOTIVE INDUSTRIES article for the first time.

It is a matter of interest that both engines were developed since the end of the war for the U. S. Navy for compact shipboard generator sets of 5-kw and 15-kw, capacity, respectively. Publication of the details of these engines is being made at this time by permission of the Bureau of Ships.

These Continental engines are of opposed piston design, full Diesel type, four-stroke cycle, compression ignition, featuring the well-known Lanova combustion principle used in larger Continental Diesel engines. They are naturally aspirated and have a wet sump.

Designed initially for small portable Diesel-generator sets their commercial use has many applications

including the following: Air-conditioning units in railroad passenger cars; and refrigeration of freight cars; for air-conditioning of Diesel-powered buses; refrigeration of truck and trailer bodies; portable auxiliary lighting plants; portable pumps for mines and lumber camps; auxiliary power for farm implements; and for small tractors and farm equipment.

Both engines are fitted with the new American Bosch single-plunger fuel pump, type PSA, driven at crankshaft speed. The Bosch device incorporates as

a unit assembly the supply pump and governor as well.

The crankcase is a two-piece aluminum alloy casting, split symmetrically at the vertical center line of the engine. Cylinder heads, pistons, and other structural parts also are of aluminum alloy. Individual cylinders are of steel with Alfin construction. Main and connecting rod bearings are replaceable, precision type, lead-coated Tri-Metal supplied by Cleveland Graphite Bronze.

Interchangeability of major parts concerned with maintenance operations has been carried out to the maximum degree. For example, complete cylinder assemblies—including cylinder barrel, head, connect-

(Turn to page 58, please)

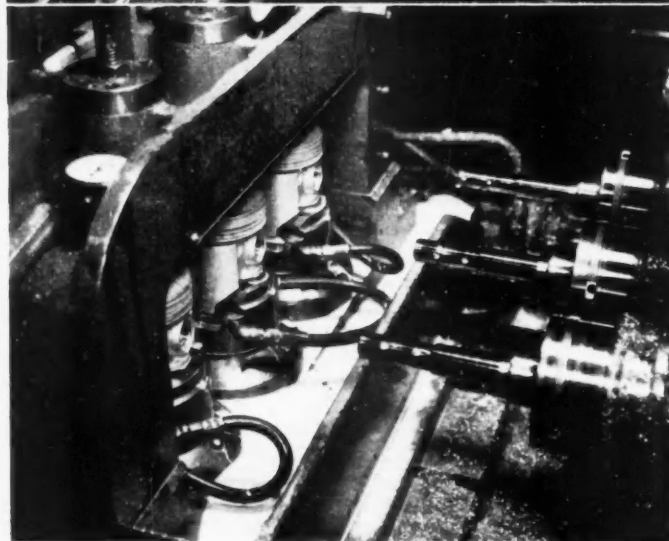
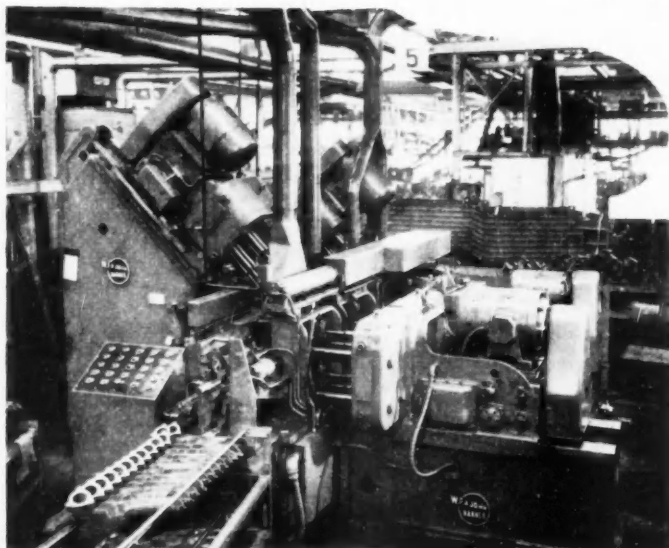
Continental Air-Cooled, Horizontally- Opposed Overhead-Valve, Diesel Engines

Model	AOD-60	AOD-120
No. cyl.	2	4
Bore (in.)	3 1/4	3 1/4
Stroke (in.)	3 1/4	3 1/4
Displacement (cu in.)	60.14	120.28
Compression ratio	17 to 1	17 to 1
Bhp, continuous (full load)	9.75 at 1825 rpm	25.14 at 2400 rpm
Bhp, overload, (24-hr rating)		29.33 at 2400 rpm
Bmep, normal	70	69
Bmep, overload		80
Weight complete, less starter	202	279
No. main bearings	2	3

Making Manifolds, Pistons and Connecting Rods for

AMONG the interesting pieces of equipment in the Oldsmobile Rocket engine plant is a transfer machine for performing a number of operations on exhaust manifold castings. Ordinarily such odd-shaped castings are difficult to handle and up to now have required a number of hand operations. Olds manifolds are machined automatically in the W. F. & John Barnes double-deck, four-head, progress-through unit illustrated here, for a variety of drilling, boring, tapping, and notching operations. The machine is controlled by a single operator who feeds castings into the unit and watches the control panel to assure satisfactory progress of operations. The double-deck feed carries both right and left hand exhaust manifold castings through the machine together, with the left-hand casting on the bottom and the right-hand casting in the fixture above it.

In the first stage, the right-hand head comes into action as the two castings index into position before it. This head has 12 spindles, eight of them being used in the first position to drill four holes in cylinder-head joint faces of both manifolds. The parts are then transferred to the next position where the other four spindles counterbore two end portholes in both manifolds; meanwhile, in this position a left-hand head moves in with



(Top) Close-up of the double-deck, progress-through machine for automatic machining of manifold castings for the Oldsmobile Rocket engine.

(Left) Precision boring of piston pin holes is done in the double-end, three-spindle machine in close-up here. Boring spindles are at the right. The three pistons are located in the fixture by means of the weight bosses and locating holes.

By Joseph Geschelin

Oldsmobile's Rocket Engine

nine spindles to counterbore port holes, drill four holes in left-hand exhaust pipe flange and three holes in the right-hand exhaust pipe flange.

The stock then transfers automatically into position before the second group of two heads. The head on the right mills one slot in each end of both manifolds while the head on the left, which contains six spindles, taps three holes in the exhaust pipe flange.

Following final milling and tapping, the manifold moves out of the machine to an operator who inserts stud bolts into the threaded holes of the exhaust manifold.

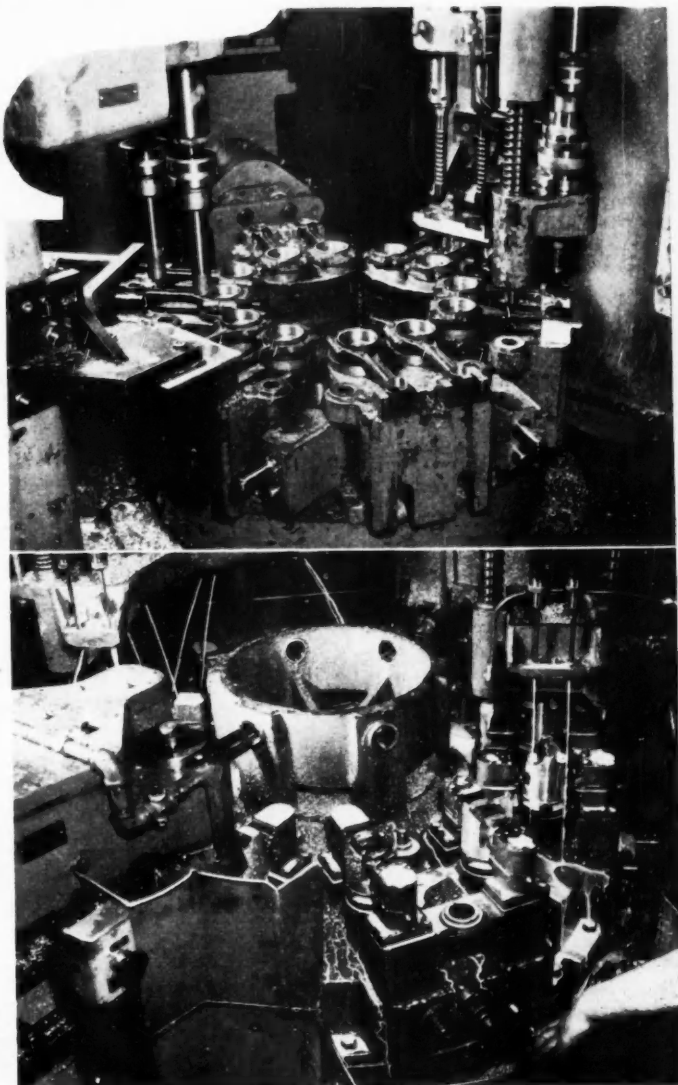
While Oldsmobile employs special transfer machines for the production of parts such as cylinder blocks and heads, and the manifolds described above, piston and connecting rod machining is of more conventional character and is performed in individual machines of special purpose design.

At the present time engine production is scheduled at the rate of 40 an hour. Consequently, it may be assumed that pistons and rods are produced at the rate of around 320 an hour, on the average.

Pistons are of slipper design and of steel strut type, made of aluminum alloy die castings. They are received in rough

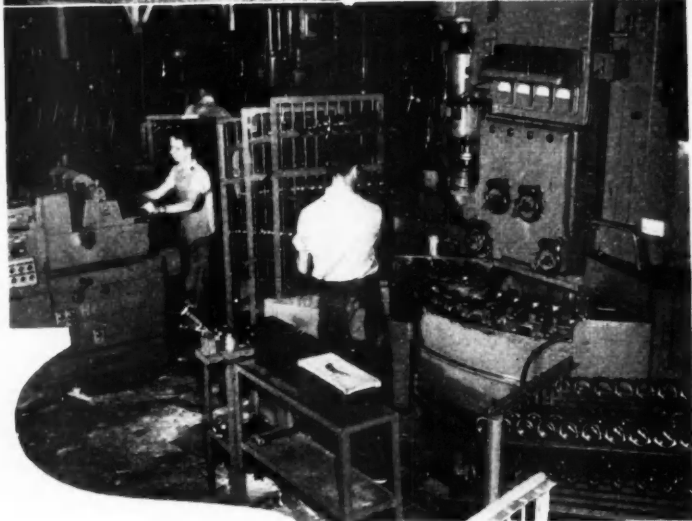
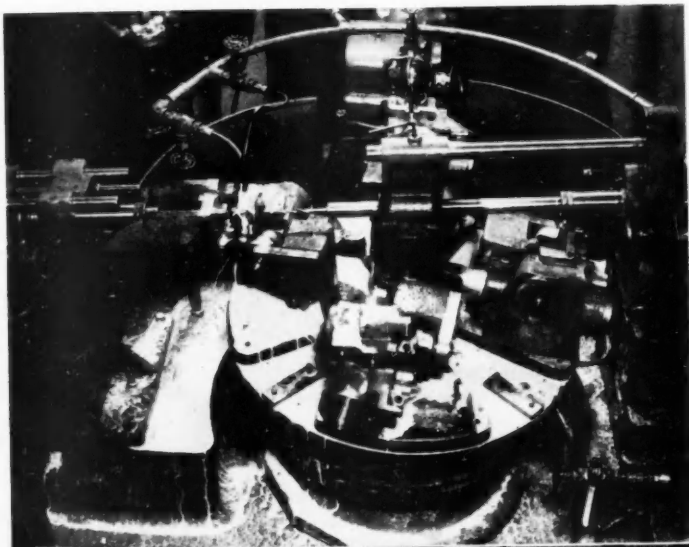
(Top) Here is a special machine on the connecting rod line for pressing the bronze bushing into the piston pin hole, in the first station at the left, burnishing the bushing at the second station at the right, and chamfering the bushing with the spindle to the extreme right of the second station.

(Right) Key to locating in subsequent machining operations on the piston line is the milling of weight pads and drilling and reaming of the two locating holes. This is done in a massive vertical machine having six fixtures on the indexing table and holding two pistons in each station. A close-up of the work table is found in this view.



(Right) Top view of work station of drum type machine with horizontally mounted spindles for counterboring and drilling the small squirt hole in the side of the connecting rod. The long drilling spindle, seen in the center directly over the top of the indexing table, reaches over the table to do the counterboring as described in the text. Note the support at the center to give adequate rigidity for the long spindle.

(Below) Typical of the mechanization of related groups of operations is this one on the connecting rod line. At the right is a partial view of the big, four-station surface grinder for finish-grinding the sides of the rod. Work comes to this machine on the chutes at the extreme right. Then the operator loads the finish-ground rods into the transfer chutes at the left to feed the precision boring machine in the background.



turned form, the preliminary operations being performed by the supplier. The first machining operation is designed to provide one of the basic locating points by centering the top face. The major locating point for subsequent operations, however, is provided by rough-milling the two weight pads within the piston near the lower end of the skirt, and drilling and reaming two locating holes.

Because of its slipper skirt design, the Olds piston must be located by means of the locating pins in all fixtures rather than by chucking, so as to prevent distortion. This operation is done in a single cycle in the special machine illustrated here. It has two machining heads and a six-station rotary indexing table holding two pistons at each station.

Next comes a battery of automatic lathes for turning the OD, form-cutting ring grooves and lands. Another special machine does the core drilling of the piston pin hole and drilling of two oil holes in each pin boss. This is followed by drilling the holes in the oil ring groove in a drum type machine with an inclined table fitted with multiple heads mounted radially in the horizontally inclined plane.

Upon completion of these preliminary operations, the piston is balanced for weight in special GMR balancing machines, holding weight tolerance to two grams. This is done by milling off the weight pads, mentioned above, and the machine is so calibrated as to provide a standard allowance for the weight of ma-

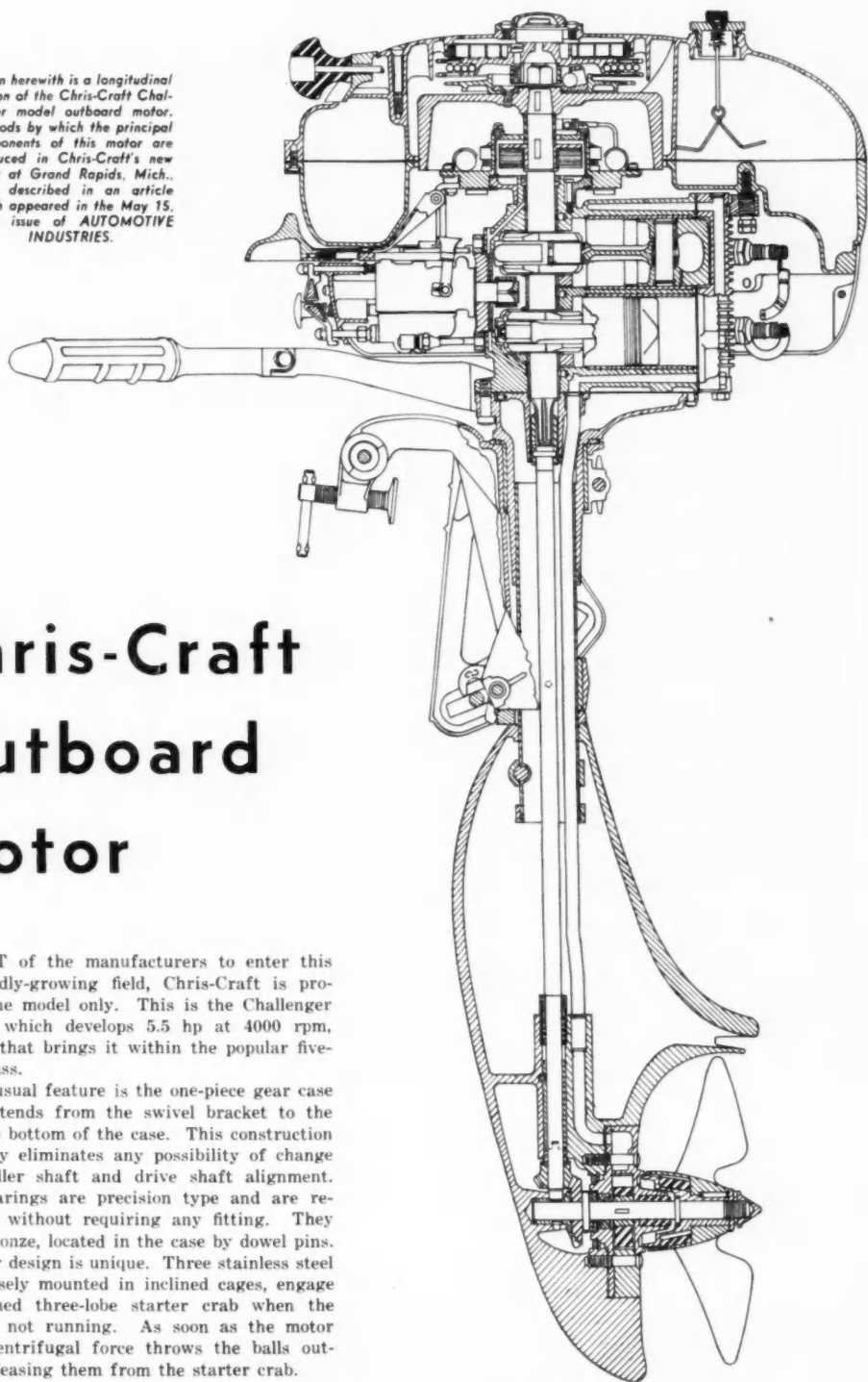
terial to be removed by the grinding operation.

Grinding of the skirt is done in external grinders fitted with a cam-grinding attachment. The coolant circulating system for these grinders is refrigerated so as to provide a standard working temperature in the interest of maintaining accurate size.

At this stage pistons are inspected 100 per cent in an air-gaging machine of unique design of Multichek type. It checks the width of ring grooves and diameter of the lands. An air snap gage also inspects the skirt for diameter and taper; an additional element being introduced to check squareness of the skirt axis with the head. All dimensions are gaged simultaneously.

(Turn to page 56, please)

Shown herewith is a longitudinal section of the Chris-Craft Challenger model outboard motor. Methods by which the principal components of this motor are produced in Chris-Craft's new plant at Grand Rapids, Mich., were described in an article which appeared in the May 15, 1949 issue of **AUTOMOTIVE INDUSTRIES**.



Chris-Craft Outboard Motor

LATEST of the manufacturers to enter this rapidly-growing field, Chris-Craft is producing one model only. This is the Challenger Model J which develops 5.5 hp at 4000 rpm, a rating that brings it within the popular five-six hp class.

An unusual feature is the one-piece gear case which extends from the swivel bracket to the fin at the bottom of the case. This construction practically eliminates any possibility of change in propeller shaft and drive shaft alignment. Main bearings are precision type and are replaceable without requiring any fitting. They are of bronze, located in the case by dowel pins.

Starter design is unique. Three stainless steel balls, loosely mounted in inclined cages, engage a hardened three-lobe starter crab when the motor is not running. As soon as the motor starts, centrifugal force throws the balls outward, releasing them from the starter crab.



Here are some of the planes lined up for the final heat of the Goodyear Trophy race. The event was won by William Brennan who set a new course record of 177.34 mph. His plane, number 20 is shown in the foreground. (Acme photo)

Technical Highlights of The 1949 National AIR RACES

Allison Jet Trophy Race

Indianapolis to Cleveland, Ohio—259.98 miles

Pilot	Plane	Engine	Av. Speed
1. Lieut. Walter C. Riew	Lockheed F-80C Shooting Star	Allison J-33-A-23 turbojet	594.806 mph
2. 2nd Lieut. F. N. Fugate	Lockheed F-80C Shooting Star	Allison J-33-A-23 turbojet	590.007 mph
3. 1st Lieut. P. E. Colman	Lockheed F-80C Shooting Star	Allison J-33-A-23 turbojet	550.643 mph
4. Capt. Charles J. Bennetto	Lockheed F-80C Shooting Star	Allison J-33-A-23 turbojet	524.623 mph

Tinnerman Trophy Race

Seven laps of 15-mile course—105 miles

Pilot	Plane	Engine	Av. Speed
1. B. W. McKillen, Jr.*	Goodyear F2G Corsair fighter	P&W R-4360 Wasp Major	386.069 mph
2. W. V. Newhall	North American P-51K Mustang	Packard V-1650 Merlin	378.735 mph
3. J. H. G. McArthur	Supermarine Spitfire Mk 14	Rolls-Royce Griffon 65	359.565 mph
4. J. B. Hardwick	Lockheed P-38 Lightning	(2) Allison V-1710	326.470 mph
5. J. P. Hagerstrom	Lockheed P-38 Lightning	(2) Allison V-1710	311.596 mph
H. S. Gidovlenko;	Lockheed P-38 Lightning	(2) Allison V-1710	
James Hennen†	North American P-51A	Allison V-1710	

* Prize includes added \$500 for fastest lap, No. 5 at 396.551 mph.

† Pulled out on 3rd lap.

‡ Pulled out on 7th lap.

NEW records were established in all major events at the 1949 National Air Races by a more conservative, better prepared and more experienced crew of pilots and mechanics than in any previous running of the classic. Gone were the devil-may-care pilots with aircraft and engines strained to and past the breaking point, who have featured previous events. In their stead were wiser, better-informed and more technically-conscious teams that carried out their assignments on the mature basis of practicality rather than the

"hope she holds together" creed of the thrill-seekers.

The single tragic exception was famed long-distance flier Bill Odom, whose death has created an uncertain future for Cleveland as home of the Air Races. Odom was the single inexperienced closed-course pilot in the high-power events and his unfortunate accident was all but predicted by wiser racing pilots. From the first circuit of his qualifying run to his unbelievably thorough destruction, Odom had "taken" the pylons in true storybook fashion by pulling into a sudden bank to the full vertical and then an equally sudden roll-out. Friendly competitors warned him repeatedly

Goodyear Trophy Race

Twelve laps of 1.75-mile course—21 miles

Pilot	Plane	Engine	Av. Speed
1. William Brennan	Wittman	Continental C-85	177.340 mph
2. Keith Sorensen	Sorensen	Continental C-85	176.726 mph
3. S. J. Wittman	Wittman	Continental C-85	176.244 mph
4. Vincent W. Ast	LeVier	Continental C-85	175.974 mph
5. Herman Salmon	Williams	Continental C-85	175.728 mph
6. Clifford Mone	Williams	Continental C-85	175.016 mph
7. Robert Downey	Ast	Continental C-85	171.359 mph
8. Luther Johnson	Johnson	Continental C-85	167.308 mph
9. J. J. Kistler*	Kistler	Continental C-85	153.396 mph
Al Foss†	Foss	Continental C-85	

* Cut pylons No. 3 and No. 5 on third lap, made one extra lap.

† Pulled out in 12th lap and received 11.12 of 10th place prize money.

By Robert McLarren

of the dangers of such flying in a 450 mhp, four-ton aircraft, particularly without an anti-g suit.

As carefully reconstructed as is possible on the basis of dozens of expert opinions, Odom's accident occurred as follows: As he rolled up into a left bank at No. 2 pylon he realized he was too close to it and eased back on the stick. After passing the pylon it was then clear that he would overshoot the new course to No. 3 pylon and he hauled back on the stick in an effort to pull around on a 60 deg turn instead of about 45 deg. This violent stick action created a high-speed stall of the airplane and quite probably blacked him out at about 8-9 g. At a speed of about 425 mph the stalled airplane rolled smoothly over on its back and struck a house. Thus, despite his famed flying experience, Odom was a victim of one of the fundamental characteristics of a fighter plane that its pilot learns early to avoid—the high-speed stall.

Evidence that victory in the National Air Races events can almost be bought is seen in Odom's racing plane, the "Beguine." The machine was one of the most beautiful, advanced and expensive pieces of equipment ever assembled. Originally a surplus North American P-51B-15-NA, the airplane was purchased by J. D. Reed, wealthy Texan, for an attempt on the world's landplane speed record (propeller-driven) of 481.4 mph, set April 27, 1939 by Fritz Wendel in a Messerschmitt Me113R. Reed is reputed to have spent \$110,000 at North American Aviation for modifications to the aircraft, some of which are described below. In contrast, Thompson Trophy Race winner Cook

(Turn to page 60, please)

Sohio Trophy Race

Seven laps over 15-mile course—105 miles

Pilot	Plane	Engine	Av. Speed
1. William Odom*	North American P-51 fighter	Packard V-1650 Merlin	386.393 mph
2. Ron Puckett	Goodyear F2G Corsair fighter	P&W R-4360 Wasp Major	384.866 mph
3. Charles Tucker	Bell P-63 Kingcobra	Allison V-1710	381.529 mph
4. Steve Beville	North American P-51D fighter	Packard V-1650 Merlin	376.719 mph
5. Ken C. Cooley	North American P-51 fighter	Packard V-1650 Merlin	373.437 mph
6. Frank Singer	Bell P-63 Kingcobra	Allison V-1710	359.060 mph
7. M. W. Fairbrother	North American P-51 fighter	Packard V-1650 Merlin	349.602 mph
8. A. T. Whiteside	Bell P-63 Kingcobra	Allison V-1710	330.399 mph
9. James L. Harp	Bell P-39 Airacobra	Allison V-1710	329.595 mph

* Prize includes added \$500 for fastest lap, No. 3 at 404.676 mph.

Bendix Trophy Race

Rosamond Dry Lake, Calif. to Cleveland, Ohio—2008.2 miles

"R" Division

Pilot	Plane	Engine	Av. Speed
1. Joe De Bona	North American P-51C Mustang fighter	Packard V-1650 Merlin	470.130 mph
2. S. H. Reaver	North American P-51 Mustang fighter	Packard V-1650 Merlin	450.221 mph
3. H. R. Salmon	North American P-51 Mustang fighter	Packard V-1650 Merlin	449.214 mph
4. D. E. Bussart	DeHavilland Mosquito light bomber	(2) Rolls-Royce V-1650 Merlin	343.757 mph
L. H. Cameron*	Martin B-26C Marauder bomber	(2) P&W R-2800 Double Wasp	
V. J. Perron†	Republic AT-12 trainer	P&W R-1630 Twin Wasp	

* Put down at North Platte, Neb., for 1 hr 7 min due to fuel line trouble, then completed race in attempt to beat 6 P.M. deadline. He landed at 7:50 P.M. Received 75% fifth place prize.

† Landed at Grand Junction, Colo., due to engine trouble and did not continue race. Received 75% sixth place prize.

"J" Division

Pilot	Plane	Engine	Av. Speed
1. Maj. Vernon A. Ford	Republic F-84E Thunderjet fighter	Allison J-35-A-17 turbojet	529.614 mph
2. Capt. J. E. Newman	Republic F-84E Thunderjet fighter	Allison J-35-A-17 turbojet	524.620 mph
3. Lieut. Col. L. E. Moon	Republic F-84E Thunderjet fighter	Allison J-35-A-17 turbojet	524.551 mph
4. Capt. Harry M. Lester	Republic F-84E Thunderjet fighter	Allison J-35-A-17 turbojet	514.747 mph
Capt. Franklin Rizer*	Republic F-84E Thunderjet fighter	Allison J-35-A-17 turbojet	

* Emergency landing at Peoria, Ill., and plane damaged upon landing.

Thompson Trophy Race

"R" Division—Fifteen laps of 15-mile course—225 miles

Pilot	Plane	Engine	Av. Speed
1. Cook Cleveland*	Goodyear F2G Corsair	P&W R-4360 Wasp Major	397.071 mph
2. Ron Puckett†	Goodyear F2G Corsair	P&W R-4360 Wasp Major	393.527 mph
3. B. W. McKillen, Jr.	Goodyear F2G Corsair	P&W R-4360 Wasp Major	387.589 mph
4. Steve C. Beville	North American P-51D Mustang	Packard V-1650 Merlin	381.214 mph
5. Charles Tucker	Bell P-63 Kingcobra	Allison V-1710	378.340 mph
6. James Hagerstrom	North American P-51 Mustang	Packard V-1650 Merlin	372.719 mph
7. W. V. Newhall	North American P-51K Mustang	Packard V-1650 Merlin	372.320 mph
8. James Hannon	North American P-51A Mustang	Allison V-1710	300.396 mph
William P. Odom†	North American P-51 Mustang	Packard V-1710 Merlin	
Anson L. Johnson††	North American P-51 Mustang	Packard V-1710 Merlin	

* Prize includes \$2,000 Allegheny Ludlum Award for new race record and \$100 for each of 11 fastest laps, including No. 9 at 406.351 mph.

† Prize includes \$300 for three fastest laps.

‡ Prize includes \$100 for fastest lap speed.

§ Crashed and burned on second lap.

†† Pulled out on 9th lap.

"J" Division—Ten laps of 15-mile course—150 miles

Pilot	Plane	Engine	Av. Speed
1. Capt. Bruce Cunningham	North American F-86A-5-NA Sabre	General Electric J-47-GE turbojet	566.173 mph
2. Capt. Martin C. Johansen	North American F-86A-5-NA Sabre	General Electric J-47-GE turbojet	600.192 mph
Capt. Vernon J. Henderson*	North American F-86A-5-NA Sabre	General Electric J-47-GE turbojet	
1st Lieut. Burt L. Cashin†	North American F-86A-5-NA Sabre	General Electric J-47-GE turbojet	

* Pulled out in second lap due to broken seat.

† Failed to start.

Flexible Producing



View of portion of
Ajax-Hultgren salt
bath furnace.

ALTHOUGH a cylinder sleeve appears to be a simple machined part, its production is really a somewhat complicated affair. Sealed Power has found that the variations in materials, specifications for size and finish, and the range in sizes and forms pose a neat problem of scheduling and processing.

In operation a little over a year, the Sealed Power plant in Rochester, Ind., specializes in cylinder sleeves of wet and dry types, hardened or soft, in sizes ranging from 2 $\frac{1}{4}$ -in. bore to an experimental run of 8 $\frac{1}{2}$ -in. bore. Taking variations into account, Sealed Power faces the problem of scheduling some 550 different sleeves for original equipment and replacement.

The modern new plant at Rochester has a floor space of some 58,000 sq ft, and is equipped with machine tools selected particularly for flexibility. Because of the differences in size and form, and because sleeves are produced in relatively small lots at a time, the machine tools must be capable of quick change-over from one job to another. Among the major items of such equipment in this plant are: Multiple-spindle boring machines made by Moline, Natco, Van Norman, and Ex-Cell-O; Fay heavy duty automatic lathes; Norton cylindrical grinders; Cincinnati centerless grinders; Barnesdril honing machines fitted with Micromatic hones; and some small LeBlond lathes.

Since the sleeves are made of cast iron or alloy cast iron, all boring and turning operations are done with suitable grades of Carboloy. This type of cutting tool

is particularly important in machining hardened sleeves.

One of the newest pieces of equipment installed here is an Ajax-Hultgren salt bath unit for heat treating alloy cast iron sleeves. It consists of three units—the high-heat salt bath in which the sleeves are handled automatically in a rack type conveyor, the quench

TABLE ONE

Operation	Machine
Rough bore	Moline boring machine
Rough turn flange, groove and chamfer OD lower end, cut to rough length	Fay automatic lathe
Finish bore	Moline and Van Norman boring machines
Semi-finish turn, finish flange, undercut flange face, groove and chamfer OD lower end, chamfer ID lower end, cut to finish length	Fay automatic lathe
Chamfer ID upper end	Le Blond lathe
Final finish turn and burr	Barnesdril honing machine
Rough hone	Barnesdril honing machine
Finish hone	
Wash, inspect, package	

Setup for Cylinder Sleeves

This modern plant manufactures some 550 different sleeves for original equipment and replacement

tanks in the center, and the draw unit. Quenching is done with special fixtures, using an arbor to maintain bore size.

Perhaps the best means of indicating some of the differences in process is to reproduce a condensed routing of several sleeves. The routing immediately shown in Table One is for a soft, wet sleeve, 5½-in. bore and 11⅞-in. long.

On this sleeve the customer specifies a mirror finish for the finish hone and a total tolerance of 0.001 in. on the diameter, taper, and out-of-roundness.

The routing shown in Table Two is an example of a more complicated cycle, including heat treatment. This part has a bore of 4½ in. and is 11 5/16 in. long.

The customer specifies a final surface finish on the bore of 15 to 25 micro-inches (rms). Tolerance on the bore is held to 0.0015 in.

It is of interest that final inspection of bores is done with Sheffield Precisionaire gages so designed as to provide readings of diameter and out-of-roundness as well.

These routings illustrate a general principle of operations with rough-boring as the first step, followed by rough-turning. Since expanding arbors are used for the latter operation, the application of the arbors generally will uncover seams or cracks in the casting, thus reducing the amount of wasted labor incident to this type of foundry defect. Roughing operations then are followed by finish turning, and double honing.

One of the complexities of producing sleeves for a large number of engine builders arises from the end-

TABLE TWO

Operation	Equipment
Rough bore	Moline boring machine
Rough turn and cut to length	Fay automatic lathe
Semi-bore	Moline boring machine
Semi-finish turn	Fay automatic lathe
Harden and draw (350 - 400 Brinell)	Ajax-Multgren salt bath
Face ends, chamfer ends, spot grind OD	Cincinnati Centerless grinder and converted Fay Automatic
Finish bore	Moline and Natco boring machines
Chamfer ID lower end, break corner ID upper end	LeBlond lathe
Rough hone surface finish 45 micro-inch (rms)	Barnesdill honing machine
Finish grind OD	Norton cylindrical grinder
Detail operations, including milling of valve clearance, wash, inspect, wash and package.	

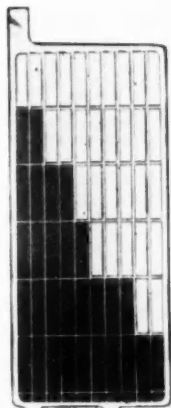
less variations in specifications. Dimensionally each customer has his own standards for the tolerance on the honed bore, for taper, and out-of-roundness. Similarly, there are almost as many specifications for surface finish as there are customers. To these can be added another variable criterion—the character of the cross-hatch pattern for finish honing.

New Grid Design and Casting Process Lengthen Battery Life

Gould's new grid design in which all cross members are the same size and shape. It has fewer vertical and horizontal members than in older grids.

POSITIVE grid failure is responsible for a large percentage of motive-power battery failures. Facing this fact, the Laboratories of the Gould Storage Battery Corp. singled out the positive grid for concentrated scientific attack.

Studies showed that the positive grids of lead acid batteries failed because the grid-members separated after
(Continued on page 56)



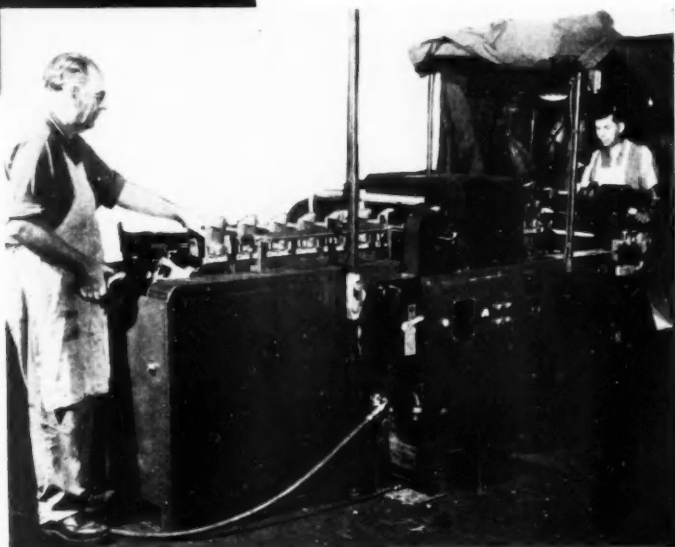
Magnaglo Inspection

Before Machining



(Above) This is a view in the inspection booth in the engine plant, showing Magnaglo examination of Kaiser-Fraser cylinder block castings.

(Right) View of entire Magnaflux unit for inspecting rough steering knuckle forgings at Kaiser-Fraser. The loading end is at the left, the magnetizing station in the center, and the inspection station is the booth at the extreme right (hood raised).



CONTRIBUTING to the expanding practice of preventive inspection by non-destructive methods is the Magnaflux Magnaglo inspection of rough forgings and castings. The new idea is to inspect parts in the rough to detect hidden defects before such parts might enter the machine shop. By thus checking it is possible to reduce rejections of machined parts to a minimum, thereby avoiding costly losses in productive time and labor.

A Magnaflux unit was designed for Willys-Overland Motors, Inc., specifically for inspecting a large variety of forgings such as connecting rods, steering spindles, spindle supports, steering arms, etc., none of which is produced in quantities sufficiently to justify an automatic machine for an individual part. This machine is sufficiently flexible to permit complete change-over from one part to another in from 15 to 30 minutes. All sequences except load-

Saves Costs

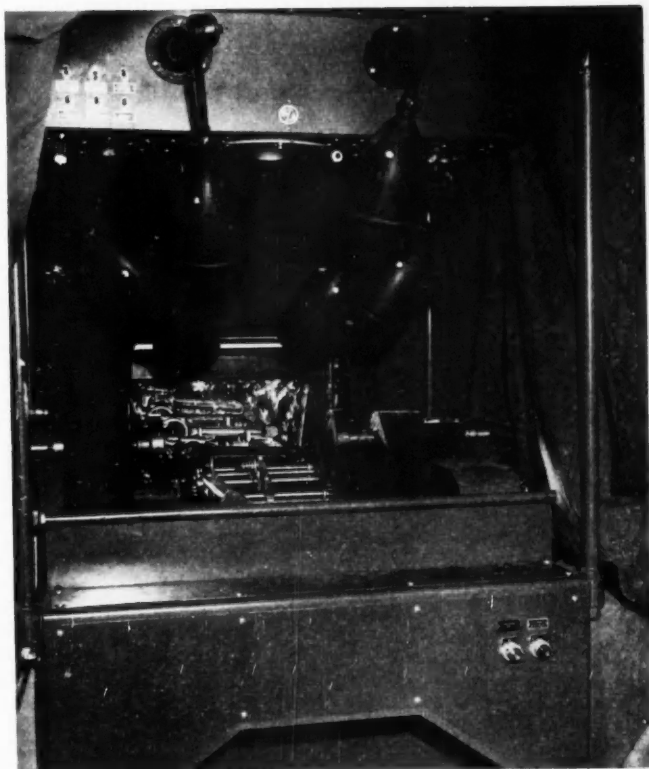
ing are fully automatic. Machine rate is variable up to 1200 pieces an hour. Conveyor movement is intermittent to facilitate loading, clamping for magnetizing, and clamping for pick-up and rotation. The magnetizing clamp headstock, rotating clamping heads, and tray tilting mechanism are all air cylinder operated, solenoid air valve controlled.

In operation, parts to be inspected are hand loaded onto the conveyor fixtures which carry them between magnetizing heads where they are clamped while a high amperage (3000 amp maximum), low voltage current is applied to induce circular magnetization. Next the parts are carried through a spray hood where Magnaglo suspension, consisting of fluorescent dyed ferrous particles in a light oil, is applied. Indications of defects such as forging laps, seams, inclusions, etc., are formed at this stage.

The parts then are transported to the hooded inspection booth at the exit end of the machine. Here they are automatically unclamped, removed from the conveyor, and rotated in the fixture for inspection under "black" light lamps where they are scanned by the inspector. Accepted parts are dropped onto a tray which tilts to the right, permitting parts to slide through a demagnetizing coil. Then they drop onto a conveyor for transport to the machine shop. When the inspector detects a defective part, he depresses a foot switch, causing the tray to tilt to the left so as to slide the part into a tote pan. Rejected parts are not demagnetized since the indications must remain for the guidance of the salvage inspector.

At Kaiser-Frazer the major application of Magnaglo is the special automatic inspection unit for the surface inspection of steering knuckles, steering knuckle supports, and steering arms while in the rough forged state. A two-man crew can inspect up to 3500 parts in 24 hr.

Forgings are loaded in the fixtures on the conveyor



Closeup inside the inspection booth at Willys-Overland shows the rotating fixture in the foreground and the bank of six Magnaglo "black" light lamps overhead.

chain and transported through a magnetizing unit in the center of the machine, then through a second stage where Magnaglo solution is sprayed on. The parts continue to a booth at the end of the machine where they are picked up automatically one by one in a fixture which revolves the work so as to present the entire area to the inspector.

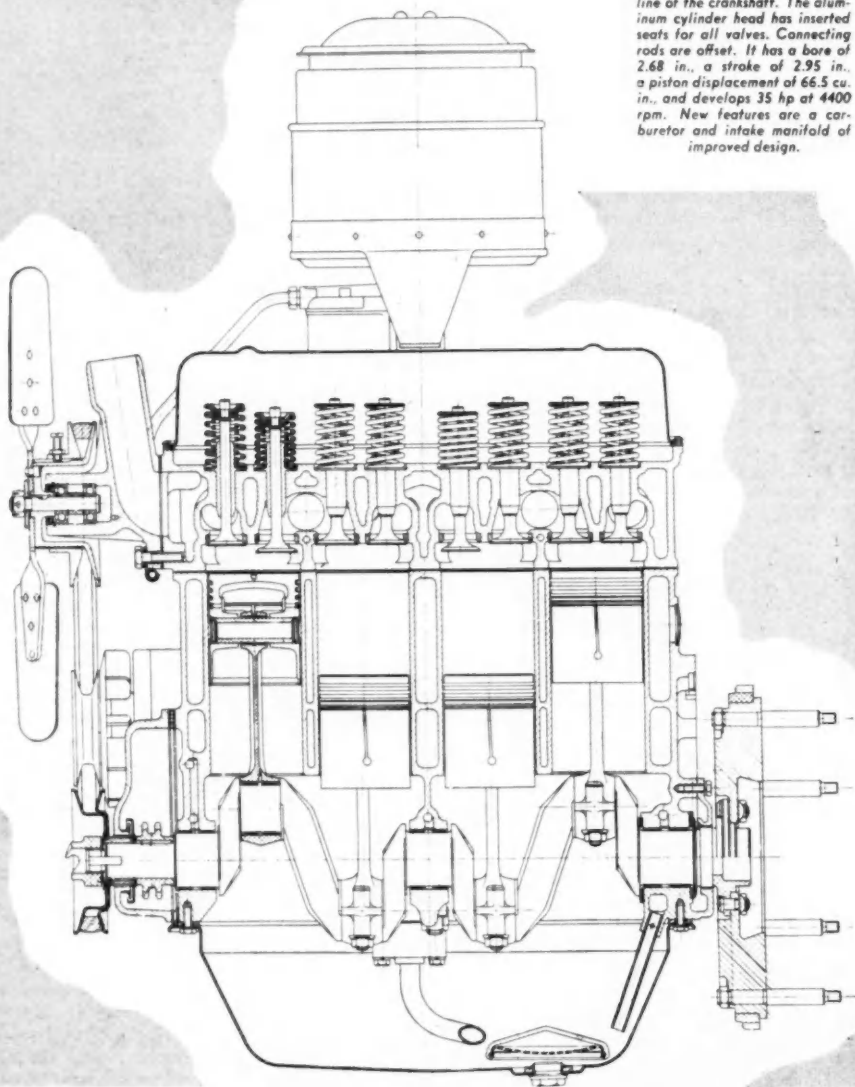
As the forging is revolved it is exposed to a group of four ultra-violet lamps. If any surface flaws are present they appear as white lines. Accepted parts are automatically routed to a chute where they pass through a de-magnetizing station before being unloaded. If a part is defective the operator flicks a lever which causes the part to be discarded to a reject chute on the side.

The second Kaiser-Frazer Magnaglo application is in inspecting cylinder block castings before they are cleared to the machine shop. When received from the foundry, the blocks are cleaned in an acid bath, washed, and magnetized. Then they are dipped in a solution of Magnaglo fluid. The blocks thus treated are conveyed into an enclosed booth where the operator examines the cylinder bores for evidence of defects.

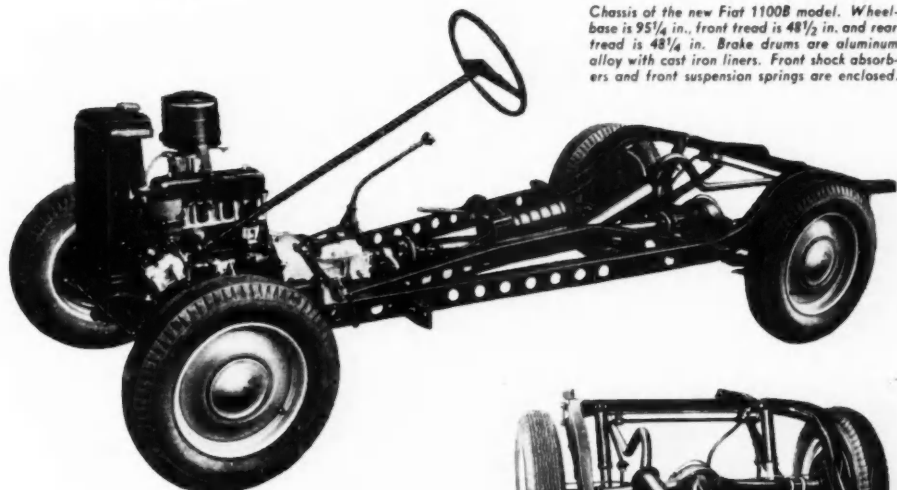
Design Features of

Here Are Engine and Chassis Details of the Latest
Offering by Italy's Largest Automobile Manufacturer

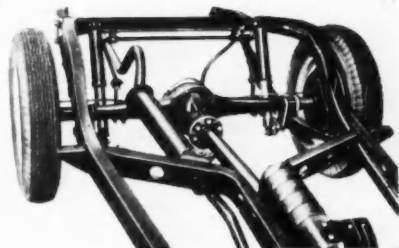
Longitudinal section of the Fiat four-cyl engine through center line of the crankshaft. The aluminum cylinder head has inserted seats for all valves. Connecting rods are offset. It has a bore of 2.68 in., a stroke of 2.95 in., a piston displacement of 66.5 cu. in., and develops 35 hp at 4400 rpm. New features are a carburetor and intake manifold of improved design.



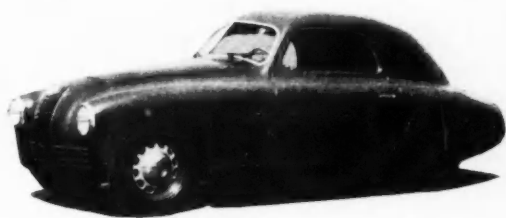
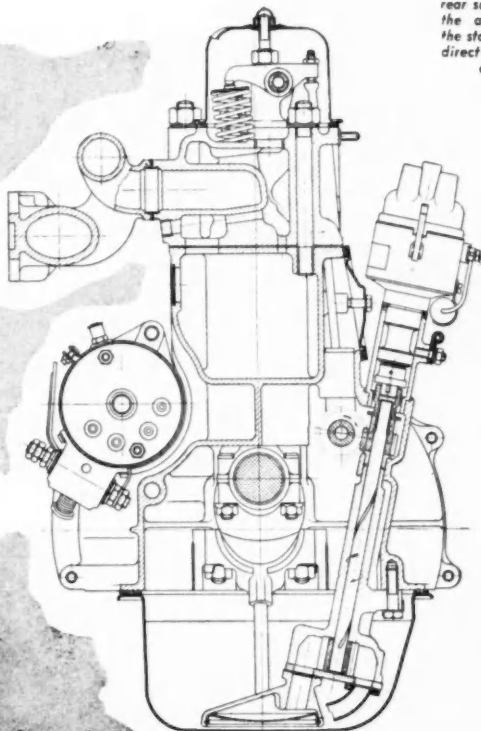
Fiat's New Model 1100B



Chassis of the new Fiat 1100B model. Wheel-base is 95 $\frac{1}{4}$ in., front tread is 48 $\frac{1}{2}$ in. and rear tread is 48 $\frac{1}{4}$ in. Brake drums are aluminum alloy with cast iron liners. Front shock absorbers and front suspension springs are enclosed.



This illustration of the rear suspension shows the arrangement of the stabilizer bar and direct-acting shock absorbers.



This Model 1100 sports car has the same 35-hp engine as is used in other Fiat models.

Transverse section of the Fiat 1100B engine.



Fiat 1100B cabriolet.

Centrifugal Casting

of Cylinder Sleeves and Piston Ring Pots

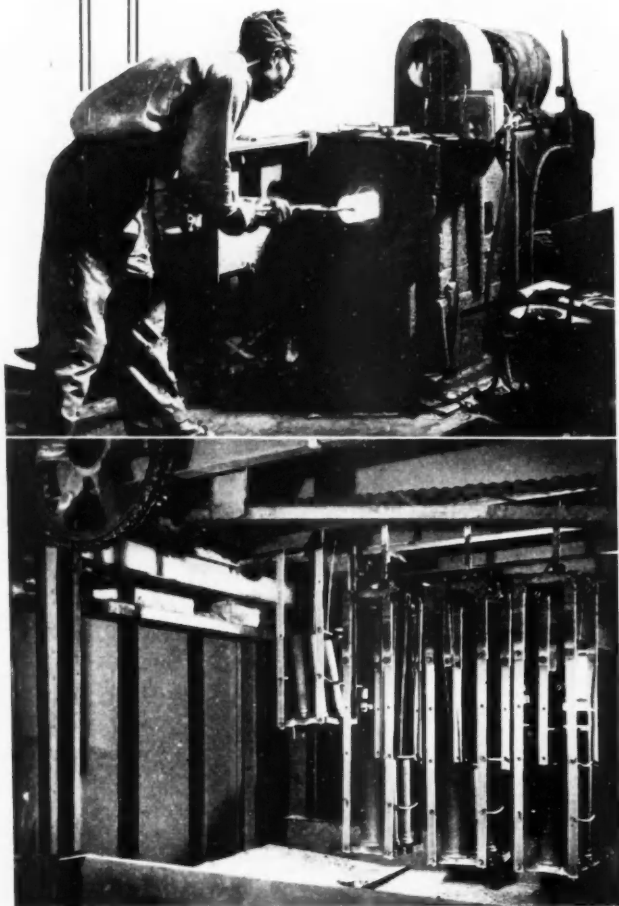
CENTRIFUGAL Foundry Co., Muskegon, Mich., has become an important supplier of centrifugally-cast cylinder sleeves and high tensile piston ring pots which are shipped in the form of rough-machined castings to various manufacturers. The company offers a group of six distinct "Centralloy" irons, bracketing the gamut of requirements of hardness, physical properties, corrosion resistance, durability and machineability.

Of the five compositions of Centralloy for cylinder sleeve irons, two are heat treated to develop high hardness, as shipped.

All alloys are produced by duplexing, employing a standard cupola for primary melting, then alloying in two Pittsburgh Lectromelt electric furnaces, one for each bank of centrifugal casting machines. Further improvements in composition control and cleaner metal are obtained by use of a semi-continuous tap from the cupola into a de-sulfurizing forehearth.

Heat treating to produce specification properties for the various alloys is done in a specially designed Ajax-Hultgren salt bath furnace, provided with precise control of time and temperature, and fitted with an automatic rise-and-fall type conveyor for transporting work through the various phases of the furnace. It has three stages—a preheat tank, a high heat tank, and a quench. Said to be exclusive with this company, the furnace cycle is designed specifically for an isothermal transformation of structures.

All molds are of the same type and
(Turn to page 58, please)



(Top) Typical of the specially designed centrifugal casting machines is the unit seen here. The operator is removing a completed casting.

(Bottom) Shown here is the special rise-and-fall conveyor for transporting castings through the three phases of the Ajax-Hultgren salt bath isothermal furnace.

Automatic Checking of Valve Lifter Dimensions and Hardness

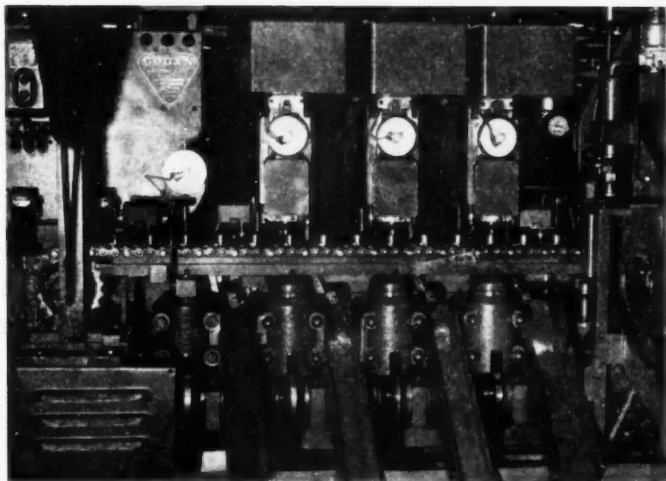
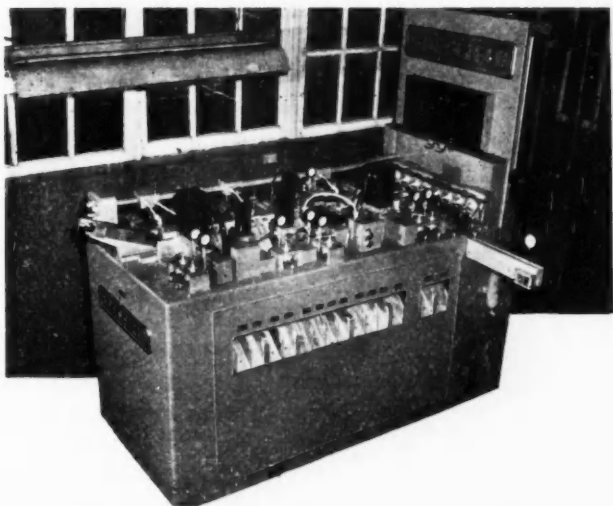
To keep pace with the increased productivity of advanced methods of fabrication Buick has introduced several high speed, automatic inspection machines for checking valve lifters. One unusual example is found in the automatic checking of Rockwell hardness of the foot of the lifter. At one time it was the practice to check for hardness at one point only. Currently, engineering specifications require checking at three points 120 deg apart. Considering that each engine requires 16 valve lifters, this implies checking at 48 points for each set and demands special means for the purpose if high levels of productivity and economy are to be maintained.

The Gogan automatic diamond hardness tester accomplishes this without operator supervision. One operator is concerned entirely with keeping the magazine loaded. Work is picked up on a power-driven conveyor and carried under four separate heads. The first is a dial gage for a final check on the overall length of the part. Each of the other three heads is a diamond hardness tester.

It will be noted that there is a chute under each of the four heads. If the work fails to be accepted at any of the stations, it is automatically rejected into the chute at the point of rejection. Accepted pieces, however, continue on the conveyor carrying the parts outside the machine into shop containers. By keeping the pans at each
(Turn to page 58, please)

Close-up of Gogan automatic inspection machine for checking Rockwell hardness of valve lifters. Parts are moved on the conveyor under the heads above. The three heads to the right check hardness. Rejects are discarded through the chutes in the foreground; accepted work comes out of the machine via the chute at the extreme right.

The big Sheffield inspection machine shown below is responsible for the automatic checking of seven distinct dimensional characteristics of the Buick valve lifter. Parts are fed in on a magazine and progress automatically on a mechanized conveyor in the center of the machine between the inspection heads. Rejects are discarded through the group of 14 chutes seen on the front panel of the machine. Accepted work comes out by way of the chute at the extreme right. The indicating panel, covering each of the inspection phases, may be seen at the right.



Douglas Method of Preserving Stored Tooling

By Howard N. Smith

Assistant Supervisor of Planning
El Segundo, Calif., Plant,
Douglas Aircraft Co., Inc.

THE necessity for retention of airframe jigs, fixtures and patterns due to the possibility of replacement and spare parts requirements for both experimental and production aircraft, presents a major storage problem in the aircraft industry. This type of tooling, large in size, and fabricated from iron pipe, steel and plaster, must, in some instances, be maintained for a period of as much as all of seven years

by contractual obligation.

The development of plastic coatings during and after the close of World War II reached a point where it appeared that

such materials were the answer to tool preservation problems. This fact was further substantiated by preservation methods used by the Armed Services. Since then experiments were made at the Douglas Aircraft Co.'s El Segundo, Calif., plant with various types of plastic materials, methods of application and comparative cost analysis made. It was determined, through such experiments, that a strippable plastic coating provided the best protection and assured expedient readiness for reuse.

The preservation of jigs and fixtures fabricated from iron pipe and steel is

(Turn to page 67, please)

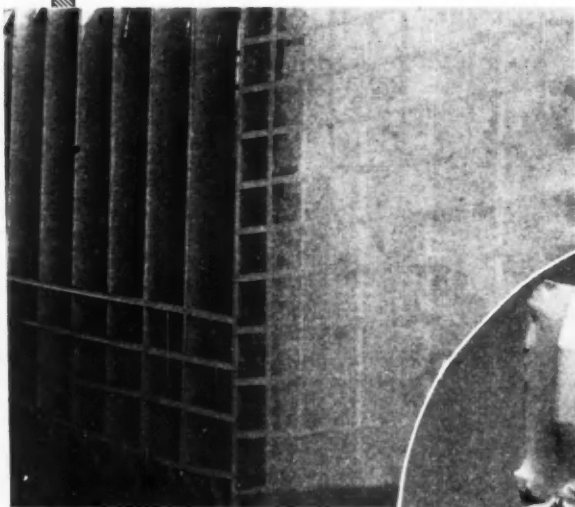


Fig. 1 (Above) A portion of a large type assembly jig in the process of being enclosed with strippable plastic coating in the first operation showing the application of masking tape and the webbing agent.

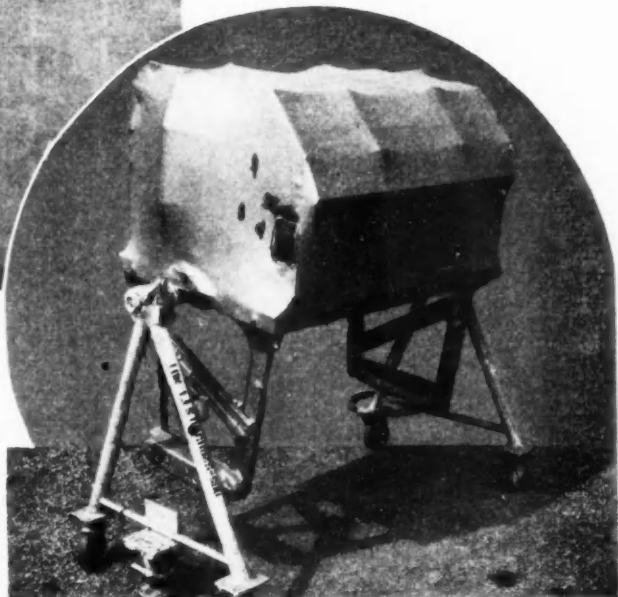


Fig. 2 (Right) A typical assembly jig to which the first coating of strippable plastic has been applied over the tape and webbing agent.

Motor Vehicle, Body and Parts Industries Show Big Growth

General Statistics for the Motor Vehicles and Parts and Truck and Bus Bodies Industries, United States Totals: 1947 and 1939

(Money figures and man-hours in millions)

	1947		1939
	Motor Vehicles and Parts	Truck and Bus Bodies	Total
Number of establishments	963	603	1,566
All employees			942
Number (average for the year)	653,169	28,646	679,815
Salaries and wages (total)	\$2,067.5	\$70.4	\$2,145.9
Production and related workers:			
Number (average for the year)	550,693	22,576	561,569
Man-hours (total)	1,102.6	47.2	1,149.8
Wages (total)	\$1,687.7	\$62.7	\$1,750.3
Value added by manufacture	\$3,577.4	\$127.4	\$3,704.8
Expenditures for new plant and equipment	\$269.7	\$8.8	\$278.5

n.a.—Not available.

¹ Value of shipments less cost of materials, fuel, electricity and contract work. For 1939, value of production less cost of materials, etc.

THE Motor Vehicles and Parts industry comprises establishments primarily engaged in manufacturing or assembling complete passenger automobiles, trucks, commercial cars and buses (excluding trackless trolleys) and special purpose motor vehicles such as ambulances, hearses, fire engines, taxicabs, etc. Also included are establishments primarily engaged in manufacturing motor vehicle parts and accessories. Included are such parts as passenger car bodies, motor vehicle engines and parts, brakes and parts, clutches, axles, radiators, differentials, transmissions, wheels and frames, and automobile accessories not elsewhere classified, such as windshield wipers, and oil filters and strainers. Establishments primarily engaged in manufacturing motorcycles, wheel-tube and track-laying tractors, tires and tubes, automobile glass, motor vehicle hardware, head lamps, ignition systems, and storage batteries are classified in other industries.

The Truck and Bus Bodies industry comprises establishments primarily engaged in producing truck and bus bodies for sale to other than motor vehicle manufacturers and in producing completed vehicles on purchased chassis. Establishments producing truck and bus bodies for sale to motor vehicle manufacturers were classified in the Motor Vehicles and Parts industry.

Production and Use of Parts for Passenger Cars, Trucks, and Buses During 1947

(Figures in thousands of units)

PRODUCT	Total Number of Units Produced ¹	Total Number of Units Used in Assembly of New Vehicles ¹ 1947	Total Number of Units for Replacement and Other Purposes ¹
Engines, new (with or without cylinder heads, fuel pumps, water pumps, and other standard components):			
Gasoline	5,767	4,680	1,087
Diesel and semi-Diesel	18	13	2
Carburetors	7,304	4,680	2,624
Pistons:			
Aluminum	50,407	22,650	27,757
All other	16,396	6,218	8,178
Piston rings:			
Oil type	197,582	47,901	149,681
Compression	356,113	62,148	293,965
Fuel pumps	14,563	4,693	9,890
Water pumps	9,485	5,546	3,939
Storage batteries	31,652	4,693	26,959
Battery charging generators	5,720	4,693	1,035
Starting motors	5,751	4,693	1,058
Spark plugs	252,116	30,797	221,319
Mufflers (exhaust)	13,559	4,693	8,866
Muffler tailpipes	8,125	4,693	3,432
Radiators, complete	5,817	4,693	1,124
Radiator cores (include cores incorporated in complete radiators)	5,940	4,693	1,147
Wheels (passenger car and truck and bus types including those for truck trailers and trailer coaches)	29,066	24,691	4,397
Universal joints	12,937	6,976	5,961
Valves (intake and exhaust only)	125,814	61,736	64,078
Shock absorbers	21,340	16,696	4,644
Fan belts and similar type belts for motor vehicle engines	35,667	5,678	29,989
Clutch disk and facing assemblies	11,778	4,472	7,306
Headlights, sealed beam units	17,057	9,396	7,671

¹ In 1947, the number of motor vehicle parts for the replacement market was derived from the figures on "Total Number of Units Produced" reported by parts producers and motor vehicle manufacturers and the figures on "Total Number of Units Used in Assembly of New Vehicles in 1947" reported by motor vehicle producers. The number of units produced included some parts suitable for use in motor vehicles but which may have been used for other purposes. However, all parts included were "new" parts. Rebuilt engines, carburetors, pistons, etc., were excluded from the 1947 Census of Manufactures.

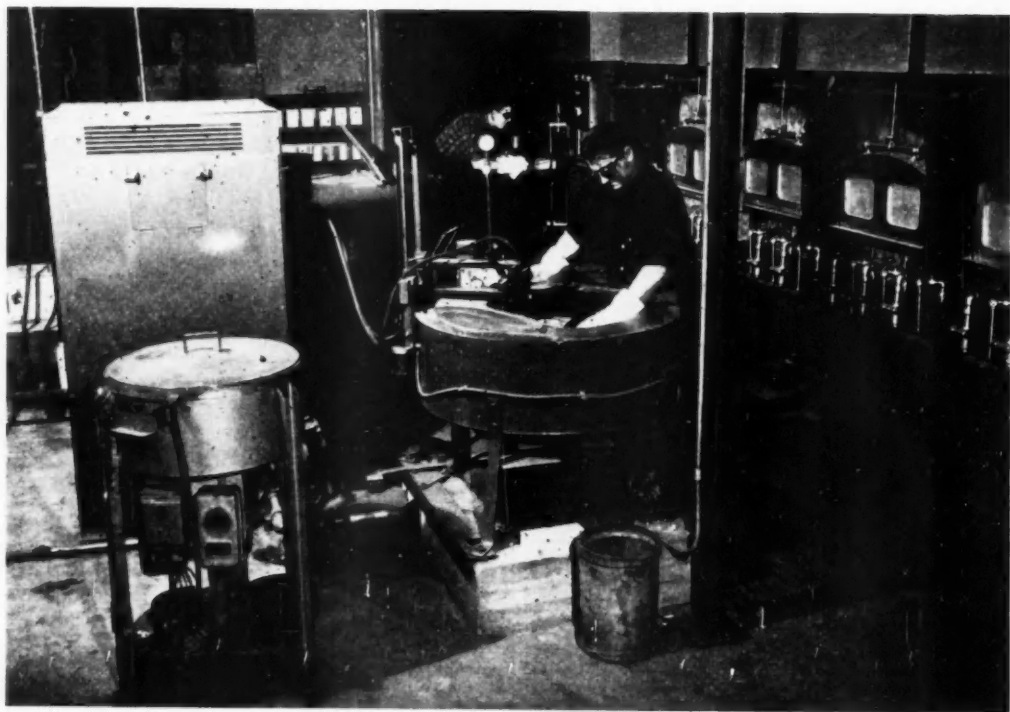
Source of Data: Industry Division, Bureau of the Census

Motor Vehicles and Parts and Truck and Bus Bodies: Quantity and Value of Products, Totals for the United States, 1947 and 1939

(Money figures in thousands of dollars)

PRODUCT	1947		1939	
	Quantity (Number of Units)	Value F.O.B. Plant	Quantity (Number of Units)	Value F.O.B. Plant
Passenger cars		\$4,085,547		\$1,806,310
Complete vehicles, knocked-down or assembled	3,544,532	4,080,311	2,824,203	1,708,503
Chassis for sale separately	4,197	5,236	21,227	6,807
Other vehicles produced on chassis of own manufacture		1,889,387		n.a.
Trucks, truck tractors and truck chassis, knocked-down or assembled:				
Basic chassis:				
Gross vehicle weight:				
5,000 pounds and less	375,191	248,273		
5,001-10,000 pounds		184,757		147,522
10,001-14,000 pounds		257,711		229,635
14,001-18,000 pounds		293,439		331,887
18,001-19,500 pounds		42,054		75,338
19,501-26,000 pounds		43,703		113,132
Over 26,000 pounds		27,018		155,096
Bodies and other equipment fitted with basic chassis		337,968		
Motor coaches (excluding trolley buses)	19,052	226,916		
Fire department vehicles	1,191	12,708	955	5,696
Vehicles produced on purchased chassis		20,267		n.a.
Ambulances	1,240	5,023		
Hearse and undertakers' wagons	2,352	9,952	2,840	6,426
Fire department vehicles	790	3,457		
Buses	378	1,835		
Bodies for sale separately to other than vehicle manufacturers, for mounting on new chassis		177,197		
Truck (include platform, stake, van, tank, dump, etc.)		131,327		n.a.
Bus	22,980	38,061		
Truck and bus bodies, not reported separately by type		9,908		
Replacement parts and accessories for passenger cars, trucks, buses and trailers for domestic use		1,496,002		n.a.
Export shipments of parts and accessories for passenger cars, trucks, buses, and trailers		124,606		n.a.

n.a.—Not available.



A section of the Electronicast plant, showing in the foreground one of the centrifugal casting machines in which the special metal for each batch is melted by induction heating. Also shown are the various furnaces.

Precision Casting of Hard-to-Machine Metals with Polystyrene Patterns

A UNIQUE method for producing investment precision castings has been developed by Electronicast, Inc., Chicago, Ill., for the production of a variety of parts which cannot be made by conventional methods of forging or machining. Casting of small, intricate parts, particularly those requiring special hard-to-machine metals and special hard alloys can be adapted to this technique. While the basic technique resembles the familiar lost-wax process, the Electronicast method features the use of polystyrene patterns in place of wax patterns.

In operation, the assembly of individual patterns into a cluster formation is effected by heating the gate of the plastic pattern and welding it to a plastic sprue button. After the patterns are aggregated, the cluster is sealed on a rubber base. The plastic patterns are dipped in a fine slurry of silica sand to give the pre-coat strength and are allowed to air dry for about 15 minutes. Then a stainless steel flask is placed over

them and the secondary investment is poured in. After the investment material has solidified, but prior to curing, the rubber base is removed.

The flask is placed into a drying oven to cure the molds at a temperature of 150 F to 200 F for about 16 hours, then moved into batch type gas fired furnaces. The temperature of the flasks is raised slowly, the plastic patterns being burned out of the flask at approximately 750 F; then brought up to a red heat, usually 1600 F-1800 F.

Maintaining the flask in an oxidizing atmosphere for several hours results in elimination of all the
(Turn to page 58, please)

Special Machine

*Has Output of
120 Exhaust
Manifolds Per Hour*

THE unique five-station special machine illustrated here, built for Ford Motor Co. by Ex-Cell-O Corp., is capable of machining more than 120 exhaust manifolds an hour. Two manifold castings are mounted side-by-side in each station, locating on three aligning flanges and two dowel holes in each manifold. Specifically, the machine mills two faces, counterbores one hole, and drills and taps four holes in the angular end flanges. At the present writing two of these Ex-Cell-O machines are installed in the foundry machine shop.

An interesting feature of the operation is the development of an automatic setup for machining an irregularly-shaped part such as the manifold without manual handling. As a matter of fact, because the parts are of irregular shape there is an advantage in holding them in the fixture without removal at any stage, thus assuring the maintenance of basic machined locations.

Flanges are finish-faced by milling from the rough in one cut with carbide-tipped, inserted blade face

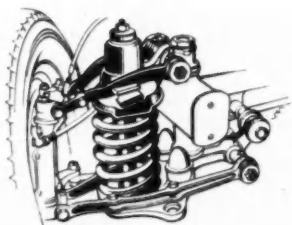


Ex-Cell-O five-station milling and tapping machine.

mills. To assure good finish and adequate tool life the fixture and machine columns are designed for extra strength and rigidity while milling spindles are equipped with taper roller bearings and flywheels.

In the cycle of operations, loading and unloading takes place at the first station. Milling and counterboring of one flange is done in the second station; while the other face is milled at station three. Drilling of the eight holes is done at station four; tapping at station five.

The machine is an excellent example of the economy of combining operations in a single automatic cycle.



German Car Has Unique Front Suspension

THE 1949 Model 170-S Mercedes-Benz has an unusual front suspension as shown in the accompanying illustration. Each support arm assembly is permitted a limited fore-and-aft movement by means of a pivot passing through the frame. An extension piece, held between rubber stops, limits the amount of movement. This construction is used to suppress resonant periods which might occur in the front suspension system. Illustration courtesy of *The Motor*, London.

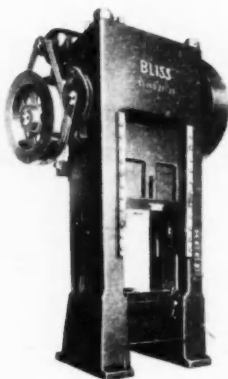
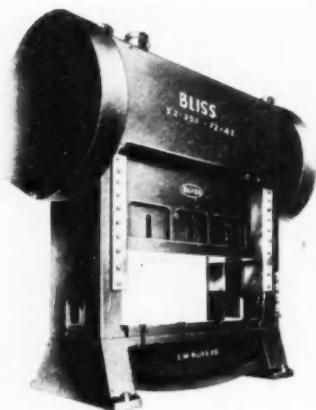
E-46—New Lines of Presses

New lines of straight side single and double crank presses developed by the E. W. Bliss Co., Toledo, Ohio, and conforming to recently established standards of the Joint Industry Conference embody a "practical enclosure" of working parts while retaining decided advantages for accessibility and adjustment.

Features include "box" type crowns and slides reinforced by deep internal ribs, and a barrel type slide adjustment—a former Bliss special feature, now standard equipment, which permits long adjustment to accommodate dies vary-

NEW Production and Plant EQUIPMENT

For additional information please
use coupon on page 48



Bliss 250-ton double crank press and Bliss 150-ton press No. 51-150-27-33.

ing greatly in height. Increased shut-height is also furnished. All press frames are of the four piece tie rod construction, of high grade Meehanite castings. Slides and gibs are longer for precision guiding of the die into the work, the slide remaining completely within the gibs at any position of stroke or adjustment. Power adjustment of the slide is standard equipment on all presses.

Single end drive presses with capacities up to and including 250 tons have a new type pneumatic friction clutch mounted on the crankshaft. All gears and other drive parts rotate continuously. As a result, the only load on clutch and brake during engagement and disengagement is that which is required to start and stop the counter-balanced slide and crankshaft. This means less heat and wear and longer, uninterrupted service from the clutch.

Bliss straight side single crank and double crank presses are regularly used for such metal working operations as blanking, cutting, punching, shaping, stamping, embossing and, when equipped with Bliss Marquette Die Cushions, can be employed for a considerable range of drawing and forming work.

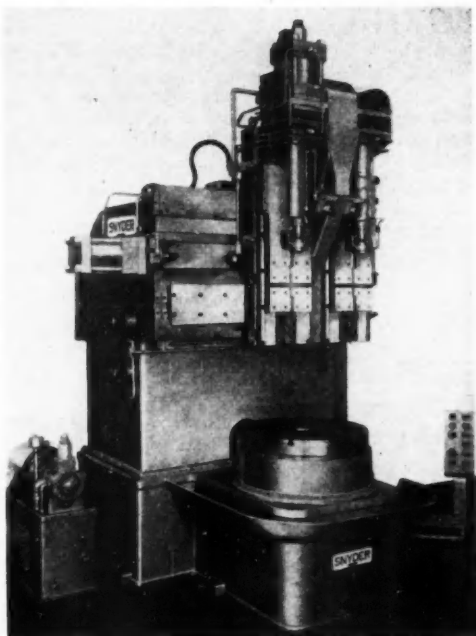
E-47—Vertical Hydraulic Lathe

A special heavy-duty vertical hydraulic lathe has been designed and built by Snyder Tool & Engineering Co., Detroit, Mich., for use by a car and truck components manufacturer to develop maximum efficiency from use of carbide tooling. Although built for a specific application, it is adaptable to facing, boring or turning a variety of large work pieces by changing the fixtures and tool holders.

The vertical, welded steel column carries a hydraulically operated, horizontal cross slide upon which are mounted two hydraulically operated vertical tool slides. Each tool slide is equipped with tee slots and keyways for mounting tool blocks and holders. The horizontal slide has a 21 in. stroke. Vertical slides have a 14 in. stroke. Horizontal slides up to 27 in. stroke can be used, and vertical slides up to 26 in. stroke. All slides and ways are hardened and ground.

A 30 in. variable speed rotating table is mounted on the base and is equipped with tee slots and pilot for mounting fixtures or chucks. The table is mounted in preloaded Timken bearings and is driven through spiral, bevel and helical gears. Power is supplied by a 15 hp motor. Drive is rheostat controlled and speeds from 46.5 rpm to 185 rpm are available. The machine can be set for various combinations of automatic cycling. Required floor space is 70 in. x 100 in.

Snyder special heavy-duty vertical hydraulic lathe.



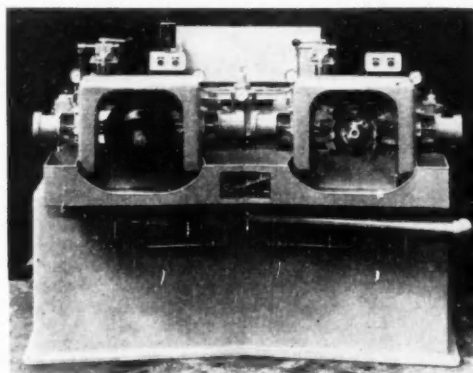
E-48—Brake Drum Superfinisher

For brake drum superfinishing the Gisholt Machine Co., Madison, Wis., announces a new two-station machine. Automotive type brake drums come to the machine turned to a surface roughness of approximately 150 micro inches. RMS and are superfinished down to 30-40 micro inches RMS. Employing one operator, total production is said to be more than 6 brake drums per minute.

The spindles and controls are independent of each other. Each work station consists of a simple arbor and two sets of stones. The two roughing stones and two finishing stones are



For additional information please use coupon on page 48



Gisholt two spindle brake drum superfinisher.

timed together to work as the brake drum both oscillates and revolves. The stoneholder movement and the clamping of the workpiece is controlled by air. Complete spindle cycle is automatic.

E-49—Radiant Gas Hardening Machine

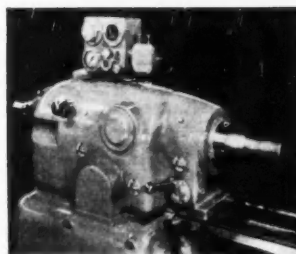
Automotive thrust plates and pump covers are hardened and quenched at the rate of 800 per hr on an automatic

radiant gas machine designed and produced by Selas Corp. of America, Phila., Pa. This kind of automatic radiant gas machine is additionally adaptable to a large number of other heating and heat-treating operations as well.

In this application, the loading arm places the pieces on the rotary refractory hearth which moves past a series of 24 radiant ceramic gas burners, advancing the pieces at the required temperature-time. At the end of the cycle, the nickel-chrome alloy ejector arm tumbles the pieces into the quench chute, which is baffled to alternate the delivery of heated pieces to two quenching chambers. The machine's high delivery frequency of heated pieces requires the two quenching chambers in order to obtain proper quenching time.

Limit switches control the operation of the unloading arm, quench chute baffle, opening and closing of the quench dies, and water injection. Premixed gas-and-air, in complete combustion proportions, are supplied to the machine at constant pressure by a Selas Combustion Controller. The machine is equipped with a Selas Fire Check.

E-50—Air-Operated Collet Attachment



Monarch air-operated collet attachment.

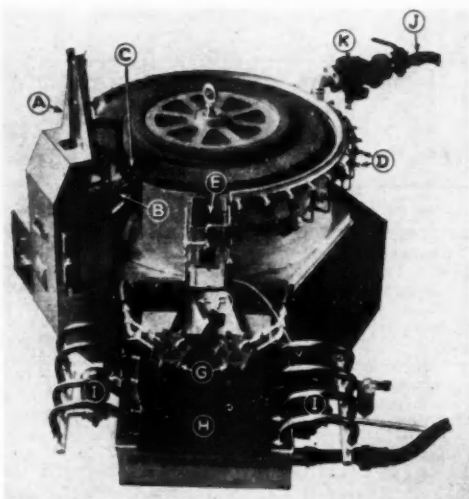
An air-operated collet attachment designed for increasing the output of its 10 in. Precision Manufacturing Lathe and its hand-operated screw machine, the Speedi-Matic, has been developed by the Monarch Machine Tool Co., Sidney, Ohio.

Unconventionally, the new design permits use of a bar feed attachment. Of the pusher type like the lever-operated collet attachment heretofore supplied for these two particular lathes, this development is said to reduce operator fatigue on long production runs. To meet smaller production requirements, however, the older type lever-operated type will continue to be available.

Two pushbuttons in the headstock of the machine control the new collet attachment. The operator presses one to open the attachment and the other to close it. This simple arrangement accounts in part for the greater produc-

(Turn to page 49, please)

Selas automatic radiant gas machine for hardening automotive plates. A, magazine, B, loading arm, C, refractory hearth, D, gas burner adjustment valves, E, unloading arm, F, quench chute baffle plate, G, quench die chambers, H, delivery plate, I, quench-water supply, J, gas intake, K, Selas Automatic Fire Check.



PUBLICATIONS AVAILABLE

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D-78 Metal and Woodworking Tools

Walker-Turner Div., Kearney & Trecker Corp.—A new 16-page catalog illustrates and describes the company's line of smaller tools. Four new models, in the catalog for the first time, include a 12 in. Band Saw, 6 in. Jointer, 8 in. Tilting Table Saw and a 9 in. Tilting Arbor Saw. Complete specifications and descriptions are given on each machine and a price list, showing recently revised prices, is included in the catalog.

D-79 Temperature Controls

H-B Instrument Co. — A complete guide for selection of H-B Double-Diamond equipment used in signaling and controlling temperature in both laboratory and plant installations, is available. Various types of equipment are illustrated and described. A simplified price list is also included.

D-80 Management Guide

American Management Assoc. — A 200-page Supervisor's Management Guide, in eight sections, prepared to assist supervisors, foremen and other

operating executives in industry to apply new developments in management methods for improving human relations in business, is available. Copies of the Guide may be obtained by writing to American Management Association, 330 W. 42nd Street, New York 18, N. Y., the price is \$3.50.

D-81 Motorized Centers

Moore Special Tool Company, Inc.—Moore Motorized Centers, new grinding attachment for use on surface grinders, jig borers, jig grinders, drill presses and light milling machines, is described in a new catalog. Action photographs are included showing the attachment's many uses, including taper grinding, contour grinding and face plate work. Detailed specifications are included.

D-82 Automobile Facts and Figures

Automobile Manufacturers Association — The 29th edition of Automobile Facts and Figures presents some pertinent facts on developments in the automotive industry during the year 1948. Production figures for trucks and passenger cars, employment census,

gasoline consumption, etc., are a few of the many tables and charts included in the booklet. Write to Automobile Manufacturers Association, New Center Building, Detroit 2, Michigan, for a copy of the booklet.

D-83 Flexible Shaft Machines

Pratt & Whitney — A new circular describes and illustrates the Series M Kellflex Machine. Complete specifications are given and the various features of the machine are listed.

D-84 Tube Fittings

The Parker Appliance Co.—A new 60-page catalog, No. 203, lists the company's line of tube fittings. Design data, specifications, materials and general dimensional data are listed for each of four types of fittings for hydraulic and fluid-handling systems. Each fitting shape is illustrated by both drawing and photograph, and dimensions are tabulated for the entire size range.

D-85 Arc Welding Accessories

General Electric Company — A new 20-page catalog containing descriptions, specifications and prices of more than 150 arc-welding accessories is available. Publication GEC-253A includes information on electrode holders, helmets, tungsten electrodes, and all types of protective aids, etc.

D-86 Malleable Castings

The Lake City Malleable Company — Application of "Shock Proof" malleable castings. (Turn to page 52, please)

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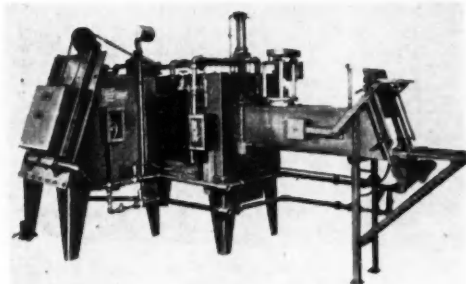
tion claimed possible with the new unit. Applied quickly to the camlock spindle nose of either lathe, the collet adapter takes standard collets and accommodates sizes handling from $\frac{1}{8}$ in. to 1 in. round stock.

E-51—Atmosphere Hardening Furnace

The Lindberg Engineering Co., Chicago, Ill., announces a new L-Type atmosphere hardening furnace for the precision bright hardening of high speed tool steels, including molybdenum, 18-4-1, 18-4-2, or cobalt type high speed steels, totally free from decarburization or carburization. The furnace, primarily developed to harden precision high speed tools such as cutters, thread chasers, etc., that have fine cutting edges and cannot be ground or cleaned after hardening, may also be used for hardening all tools and dies, for bright copper and silver brazing, and for bright annealing.

Oddly constructed compared to conventional preheat and high heat furnaces, this L-Type furnace consists of preheat, high heat and quench all built into one complete unit. The work enters cold and does not again contact air until again cold and completely hardened. The perfect control of the protective atmosphere in this furnace is said to be the result of this advanced design of furnace.

In construction, the preheat unit is



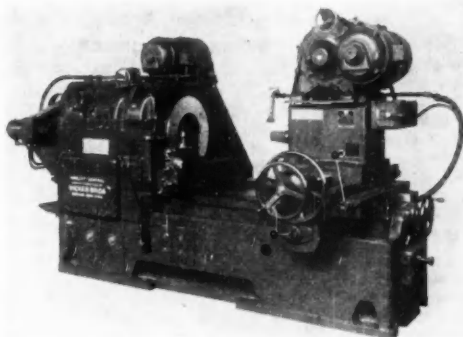
Lindberg L-Type atmosphere hardening furnace

built at a right angle to the high heat. The quench unit, likewise unique, follows directly behind the high heat unit. This quench unit is designed to quench the steel by forced convection, cooled, protective atmosphere. Sections of high speed steel up to 2 in. can be fully hardened by the atmosphere quench.

The protective atmosphere used in the L furnace is generated in a separate atmosphere generator. Either the Lindberg Hyen (endothermic) atmosphere generated from city, natural, propane, or butane gases or the Lindberg Hyco atmosphere generated from charcoal can be used. The Hyen (endothermic) is the most popular because



For additional information please use coupon on page 48



Wickes general thread miller, the Smalley No. 30.

E-52—General Thread Miller

Employing a multiple ring tooth cutter for milling straight and tapered, inside and outside, right and left hand threads, the No. 30 Smalley general thread miller manufactured by Wickes Brothers, Saginaw, Mich., permits a taper up to four in. per ft and a range of one to twenty-eight threads per in.

Large diameter work is handled with the 10 $\frac{1}{2}$ in. or 15 $\frac{1}{2}$ in. hydraulically operated 3-jaw wedge chuck. The machine may be equipped with a 4-jaw independent chuck or a face plate with boring mill jaws.

A range of milling spindle speeds is

provided from 50 to 300 rpm, and a range of main spindle speeds from 152 to 41 minutes per revolution for milling and 3.08 to 83 rpm for turning. Convenient operating controls and accessible quick change gears reduce chucking and changeover times.

The worm and gear drive to both spindles and the gear box are immersed in a bath of oil. Hardened steel ways on the cast iron bed are power lubricated. All shafts and spindles run in anti-friction bearings. Various parts, such as the lead screw nut, which are subject to wear, have been arranged with corrective adjustments. A newly designed gear box permits easy dismantling of any shaft.

Attachments, such as outboard bearings for long work, a turning and facing slide, or a tailstock are available.

E-53—Weld Current Slope Control

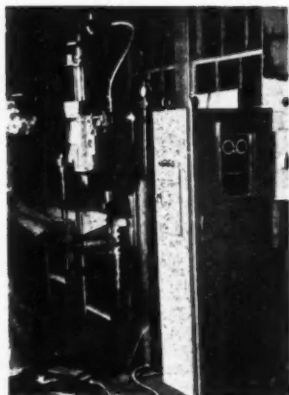
For use as an accessory with either synchronous or non-synchronous resistance welding machines of the single-phase type, a new slope control is offered by General Electric's Control Divisions, Schenectady, N. Y.

Designed to provide refinement during a gradual increase in welding cur-

rent at the beginning of the weld, the new control reduces tip pickup in spot welding aluminum, magnesium, and their various alloys. More welds, therefore, can be made before the electrodes must be redressed. Laboratory tests with this control are stated to have resulted in obtaining 20 times the number of spot welds on 0.064 in. 24 ST Alclad aluminum, before sticking occurred, than were obtained without the control. The control is also desirable for welding heavy gage steel and for projection welding, since it minimizes expulsion.

The new accessory control is furnished in two types: one intended for mounting in the side of synchronous controls, the other—in a separate enclosure—for use with older types of control and non-synchronous control. The operator's panel consists of two dials and a transfer switch. The setting of one dial, which is graduated from 3 to 13 cycles in one-cycle steps, determines the time for the welding current to reach a final value from its initially low one. The other dial, graduated in percent of the final current, permits adjustment of the initial value of the welding current. The transfer switch facilitates disconnecting the slope control for those operations for which it is not needed.

In operation, the slope control functions as a variable resistor placed in series with the heat control rheostat in the standard welding control panel. The value of this "resistor" varies with time. At the beginning of "weld time," a control relay in the slope control is energized. Operation of this relay starts an electronic timing circuit, causing the "resistor" to vary in value. By this means, the phase of the heat control in the main panel is gradually advanced. Consequently, the welding current is increased gradually from the initial value selected to the final value of current set on the heat control dial of the standard panel.



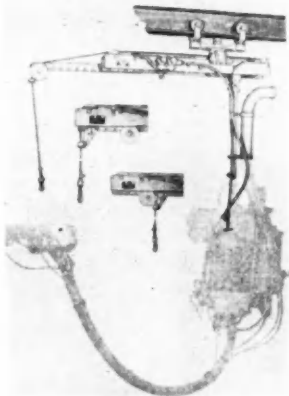
GE slope control for resistance welding machines

NEW Production and Plant EQUIPMENT

*For additional information please
use coupon on page 48*

E-54—Welder Gun Balancer-Hanger

Having no up or down creep, yet movable up or down with the slightest pressure, the portable welder gun balancer and hanger offered by the Platz Co., Inc., Detroit, Mich., gives the operator freedom to spot weld any operation without drudgery. The complete unit with trolley operates on a 4 in. standard I beam for ideal conveyor line spot welding, whether stationary or re-



Platz portable welder gun balancer and hanger

quiring up or down or right or left movement. Extra equipment affords operation on Cleveland Tram-rail or American Mono-rail.

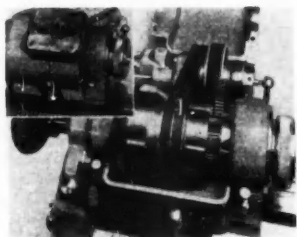
The hanger has a transformer adjustable mounting bracket, adjustable from 1½ in. to 9 in. off center of the main supporting bracket, for counterbalancing overhanging weight of the welding gun and cables. A swivel conduit tube holds the input and exhaust water hose, control wires, power wires to transformer and air or hydraulic hose to the welding gun. The complete hanger revolves 360 deg. and has an adjustable welding gun extension or

support arm allowing welding gun adjustment of 21 to 60 in. from the transformer. A safety latch holds the balanced load at the top of the balancing range when the production line is down for the day.

The welder gun balancing range is 52 in., manufactured in several sizes to balance from 10 to 150 lb. It operates on 100 lb air line pressure. All balancers are built to balance a specific weight plus or minus 2½ lb to 10 lb on larger models. This standard selected weight balancer does not consume any air, but merely uses the pressure.

The transformer hanger arm is built in various lengths. Minimum length from bottom of rail to center line of lower bolt hole in hanger arm is 25½ in. to a maximum of 44½ in. The hanger arm section is ¾ by 1½ in. and the diam of the bolt is ¾ in.

E-55—Lathe With New Features



Headstock assembly and drive assembly of Wade Model 8A lathe

Available on their Model 8 A lathe the Wade Tool Co. of Waltham, Mass., offer 1 in. collet capacity and 8½ in. swing embodying stepless spindle speeds from 32 to 2000 rpm. With the back gears engaged, the stepless spindle speeds are from 32 to 220 rpm.

The variable speed drive has an electric tachometer, located on the face of the headstock housing, which registers all spindle speeds. The drive is entirely mechanical, and is designed for the spindle speed to be changed while the drive is running. No damage is said to occur, however, if the operator should attempt to change the spindle speed when the motor is stopped. By not relying on the motor to start and stop the spindle, this drive features a clutch which permits the operator to start, stop, and brake the sprindle while the motor is running.

Powered by a 1 hp motor, with all controls protected in an enclosed panel, there is ample torque for low spindle speeds due to the back gear ratio of 9-to-1. High spindle speeds are cared for by the matched V-belts on the open drive. All countershaft bearings of the variable speed drive are ball-bearings, permanently sealed with lubricant.

The bed of the lathe is in the shape of a hollow square, ribbed for rigidity, and of a close-grained alloy cast iron.

F-74—Improved Drafters



Charles Bruning drafter with equipoise mechanism.

Improved and redesigned models of Bruning drafters announced by the Charles Bruning Co., Inc., Chicago, Ill., introduce a Bruning "Equipoise" mechanism which counteracts the effect of gravity when the draftsman is working on a tilted drawing board.

With this mechanism the drafter cannot drift down the board. Neither is there any tendency to kick back. The drafter glides into any desired position—and holds that position. The draftsman can align the drafter scales quickly and accurately to any part of his drawing.

A twist of the fluted adjustment knob on the Equipoise mechanism sets the correct tension for all board angles between 0 and 20 deg from horizontal. Heavy brake drag is eliminated. Frictionless, aircraft-type needle bearings provide smooth, easy action.

In addition to the Equipoise mechanism the improved drafters contain a redesigned base line clamp better located for aligning the drafter to the drawing; ball joints on both arms to increase flexibility, and to ease lifting the drafter head over articles on the board; and increased space between the double thumb screws by which the board is fastened to the drafter resulting in improved anchorage.

The Bruning standard drafter retains "Touch Control" by which slight thumb pressure on the touch control button allows the drafter head to be rotated to any of 24 commonly used angles. Releasing the button automatically locks the head at the desired angle.



For additional information please use coupon on page 48

A twist of the button holds the head disengaged; the head can then be locked at any intermediate angle with the head brake.

Bruning drafters are said to combine all the functions of T-square, straightedge, triangles, protractors, and scales into a single precision machine.

F-75—Fork-Lift Upender Device

Turning a roll of paper or other heavy cylindrical item 90 deg from horizontal position to vertical or vice versa, is done easily and quickly by an upending device for use with fork-lift trucks, a product of Clark Equipment Co., Battle Creek, Mich.

The load to be moved is grasped around its circumference by a set of fork arms, actuated by a hydraulically-operated clamping cylinder. Sufficient squeezing pressure is available to hold an average load securely by friction, without employment of ribs, lugs or brackets. Special rubber-covered arms can be provided for handling items that require protection.

Maximum width of the device is 35 in., and standard arms handle items of diameters from a minimum of 15 in. to a maximum of 31 in. Special arms for larger or smaller diameters are available. The upender device is at present available for both gas and electric Clark fork-lift trucks of 2000-lb capacity.

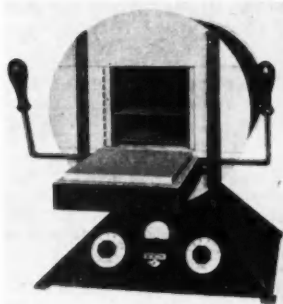


Clark upender device for fork-lift trucks.



F-76—Air Draw Muffle Furnace

Completion of an air draw muffle furnace with temperatures to 1250 F, is the latest addition to the line of laboratory muffle furnaces put out by the Hevi Duty Electric Co., Milwaukee, Wis. This furnace provides rapid and uniform heating of metals and other materials. While its primary application is the tempering or drawing of tool and die steels, it may be used for practically any heating operation requiring temperatures to 1250 F.



Hevi Duty Electric Company's latest air draw muffle furnace for temperatures to 1250 F.

A high speed, direct-connected centrifugal fan is located at the rear of the chamber with its shaft extending through the rear wall to the drive motor. A heat-resistant alloy baffle is provided to direct the flow of air from the fan through a narrow passage between the heating elements and the baffle, then into the work chamber and back to the intake of the fan. Positive high speed circulation of air throughout the furnace chamber results in the rapid and uniform heating of the work. Adjustable shelves are provided for locating the work at different levels. Two alloy shelves are furnished as standard equipment.

F-77—Lubricant and Coolant

A sulphur chlorinated oiliness water soluble, metal-working coolant and lubricant, known as EssCee Soluble No. 820, adapted to machining all SAE steels in the field of extreme pressure additives, is offered by Lubricants, Inc., Detroit, Mich. It finds use where leakage from the lubrication system contaminates the coolant or reduces its efficiency. This modified sulphur chloride fatty derivative, performing in concentrations of ten or twenty parts water to one of the additive, is stated not to harm workmen's skin or cause infection. It is claimed stainless, non-corrosive, unrancifying, and stable in storage.

PERSONALS

Recent Personnel Changes and Appointments at the Plants of the Automotive and Aviation Manufacturers and Their Suppliers.

The Carborundum Co.—**George E. Dresser**, Manager of Hardware-Automotive Sales for many years, is retiring. He will be succeeded by **Charles W. Sprenger**. **L. P. Mercer** has been appointed Assistant Manager of the Hardware-Automotive Sales Div.

Purolator Products, Inc.—**Karl H. Mayers** has been appointed Advertising Manager. He was formerly with United States Rubber Co.

Fairbanks, Morse & Co.—The appointment of **Frank M. Mason, Jr.**, as Director of Engineering, has been announced.

General Motors Corp.—The Board of Directors has elected **Ralph C. Mark** as Comptroller of the Corporation, succeeding the late **R. E. Hammond**. **Richard C. Gerstenberg** has been appointed Asst. Comptroller.

Chrysler Corp.—The election of **L. L. Colbert**, President of the Dodge Div., as a Vice-President and Director, and the election of **George W. Troost**, Comptroller, as a Vice-President, has been announced.

Norton Company—**William C. Howard, Jr.**, and **Walter E. Foreman** have been appointed Field Engineers.

Ford Motor Company—The appointment of **Albert F. Remington** to the Ford Division advertising staff, has been announced. Mr. Remington will assist **Gordon C. Eldridge**, Advertising Manager, in passenger car advertising.

Westinghouse Electric Corp.—**Hendley Blackmon** has been appointed Assistant Manager of Engineering Association Activities. Mr. Blackmon will assist **Frank Thornton, Jr.**, Manager of Engineering Association Activities.

Westinghouse Electric Corp.—**Henry N. Muller, Jr.**, has been named Assistant to the Vice-President in Charge of Engineering. **Bernard F. Langer** has been made Manager of Structural and Heat Engineering and **Erling Frisch** appointed Manager of Control Engineering, in the Atomic Power Division.

Curtiss-Wright Corp.—The appointment of **Leslie E. Neville** as assistant to **Robert L. Earle**, senior Vice-President, was announced.

Curtiss-Wright Corp.—**W. F. Goulding**, Vice-President of the Export Div., and **R. W. Young**, Vice-President of Engineering, Wright Aeronautical Corp., have resigned.

Illinois Tool Works—The appointment of **John F. Miller** as Manager of the company's Tool Division, has been announced.

Necrology

Joseph Van Blerck Sr., 74, associated with the late Henry Ford, contributing largely to the development of the first Ford automobile, founder of the Van Blerck Engine Co., producer of marine engines, one of the first competitors in the annual Gold Cup classic; and a member of the executive committee of the National Association of Engine and Boat Manufacturers from 1917 to 1928, died on Sept. 5 in Fort Lauderdale, Fla.

J. Glenn Hamilton, 66, superintendent of the Budd Wheel Co. foundry, died recently in Detroit, Mich.

William Harrison Walters, 58, regional manager in the Philadelphia region for the Perfect Circle Corp., died Sept. 13 in Wynnewood, Pa.

American Smelting & Refining Co.—**Joseph Graziano** has been appointed to the post of Assistant Manager at the Newark facility of Federated Metals Division of the company. **James F. Orr** was promoted to the post of Plant Supt. succeeding **E. R. Marble, Jr.**, who has been transferred to the Central Metallurgical Dept., as assistant to **John A. West**, Manager.

Camcar Screw & Mfg. Corp.—**James Holland** has been made Sales Manager of the company.

Service Station Equipment Co.—**Ralph Walsh** has been appointed Vice-President. His headquarters will be in the company's New York office.

SKF Industries, Inc.—The appointment of **Emerson D. Ogle** as Manager of the Industrial Sales Dept., has been announced. He succeeds **C. D. Cummings**, who has resigned.

Aluminum Company of America—**Philip T. Coffin** has been named Manager of the pig and ingot sales, and Manager of the warehousing division of the company. Mr. Coffin succeeds **Hugo T. Wilder** who was recently made Manager of the newly created marketing div.

Texas Engineering & Manufacturing Co., Inc.—**W. T. Richardson** has joined the company to head up the TEMCO Tool Design Dept.

Charles H. Besly & Company—**E. O. Howard** has been appointed Sales Engineer for the Grinder and Titan Abrasive Divisions.

Publications Available

(Continued from page 48)

leable castings, tables for milling speeds, users' specifications and finishing operations are covered in an attractive 92-page manual published by the company. Information on Standard Malleable and High Strength Malleable is found in a chapter devoted to questions and answers. A copy may be obtained by writing The Lake City Malleable Company, 5000 Lakeside Avenue, Cleveland 14, Ohio.

D-87 Rotary Gear Shavers

Michigan Tool Company — Bulletin No. 873-49 describes the completely automatic crossed-axis rotary gear shavers designed for high production finishing of large gears. Included in the bulletin are table of general dimensions and operating specifications for the two machine sizes, lists of standard and special equipment available, etc.

D-88 Belt Conveyors

Lippmann Engineering Works — Move More for Less is the title of the 12-page Belt Conveyor Bulletin made available by the company. Complete information is given on stationary, portable and 16 types of special purpose belt conveyors. Included are future applications and methods of selection of belt conveyors; dimensions, weights and specifications for standard head, tail and intermediate sections.

D-89 Filters

Titeflex, Inc. — Titeflex filters are illustrated and described in a new 12-page booklet. Included are details of construction, diagrammatic drawings showing how the filters operate, and information on the stone membrane and the wire mesh membrane.

Four typical machine shops report

"LONGER TOOL LIFE"

"BETTER FINISH"

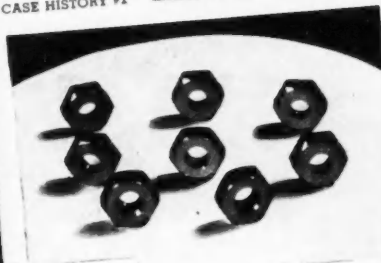
"FASTER OPERATION"

WITH NEW

J&L FREE-CUTTING "E"* STEEL

J&L STEEL

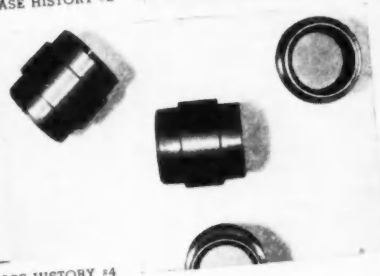
CASE HISTORY #1



CASE HISTORY #3



CASE HISTORY #2



CASE HISTORY #4



Four typical examples, taken from 100 case histories, show superior machinability of J&L "E" Steel.

For 4 years before "E" Steel was publicly announced, this new, free-cutting bessemer screw stock was tried by independent machine shops throughout the metal-working industry.

More than 6,100 tons were tested in over 100 applications!

Here are quotations from 4 typical case histories:

CASE HISTORY #1 "... tool life increased 100% at normal speeds ... better finish ... shop people liked it."

CASE HISTORY #2 "... tool life increased up to 200% ... uniformity of finish

remained constant ... considerably increased speeds without sacrifice to finish."

CASE HISTORY #3 "... tool life increased two to four times ... we were able to tap 1" full internal pipe thread, almost impossible on regular material."

CASE HISTORY #4 "... new steel machines very well ... finish excellent ... tool life increased ... 5 to 10% better production."

You too can get greater economies in your machining operations with new J&L free-cutting "E" Steel. "E" Steel is available in three grades: E-15, E-23 and E-33, each within the composition limits of the stand-

ard bessemer screw steels and with similar tensile properties. All standard sizes and shapes are available. For further information write for your copy of our new booklet: "J&L 'E' Steel."

Jones & Laughlin Steel Corporation
430 Jones & Laughlin Building
Pittsburgh 19, Penna.

Please send me a copy of "J&L 'E' Steel."

Name _____

Company _____

Address _____

JONES & LAUGHLIN STEEL CORPORATION



* "E" STEEL IS QUALITY-CONTROLLED FROM OUR OWN MINES THROUGH THE FINISHED PRODUCT

S-13—Anti-Skid Brake Device

Hydro-Aire Inc., Burbank, Calif., has been licensed to manufacture and sell a new brake attachment developed by Boeing Airplane Co., Seattle, Wash., which automatically prevents skidding and decreases airplane stopping distances, thereby saving tire wear and lessening dangers of landing accidents.

The new attachment has been operated successfully on a Boeing XB-47 Stratojet bomber and on a Boeing YC-97A Stratofreighter and currently is being installed for tests on a Boeing Stratocruiser to prove its adaptability on the new airliner.

Under the new system, operation of the airplane's normal hydraulic brake sets in motion an electronically-controlled valving unit which keeps braking pressure at all times just below the skidding point. Controlled automatically it gives the pilot the advantage of maximum runway friction regardless of nature of the landing strip.

On an icy runway, as an example, once wheels are on the ground, the pilot applies his brakes as heretofore. Normal braking action results until a fraction of a second before the point is reached where a skid would normally set in on either or both sets of tandem wheels. At that point the deceleration of the wheels on the runway causes a supplemental valve in the hydraulic system to open and reduce the braking power just enough to retain maximum braking action without skid.

The control device consists of a rotary inertia mechanism and a system incorporating a flywheel, electrical contacts and slippage clutch—all hermetically sealed in an aluminum housing. An integral "fail-safe" device allows normal braking should the non-skid system fail.

The brake is particularly applicable to tandem landing gear type airplanes such as the B-47 because of the unequal weight and load fluctuation between wheels during landing. On the more conventional tricycle gear airplanes the weight supported by either unit of the main gear is comparatively more evenly divided after the original touch-down.



(Above)
Exploded view of Boeing anti-skid brake device called "Brake Brain."

(Right)
Installation of Boeing anti-skid device on landing gear of a YC-97A Stratofreighter



For additional information please use coupon on page 48

S-14—Relay for Severe Operation



Leach relay AN-3352-1

Designated the AN-3352-1, a relay brought out by the Leach Relay Co., Los Angeles, Calif., is a double pole, single throw, double break, normally open 55 amp type, provided with a new type base-down mounting and inverted terminals for simplicity of installation and wiring. Weight is approximately 10 1/4 oz.

For severe operations from sea level to 50,000 ft through a temperature range of -55 C to +70 C, it is designed to withstand severe humidity conditions,



salt spray, sand and dust. Relays are rated for 10g vibration, 10g acceleration and 25g shock, and are capable of making motor inrushes up to 600 per cent above rated load. They are approved under Specification AN-R-20 b.

S-15—Aircraft Energizer



GE portable heavy-duty aircraft energizer

Offered by General Electric's Small and Medium Motor Divisions, Schenectady, N. Y., is a portable, heavy-duty aircraft energizer designed to provide regulated 28 1/2-volt ground power supply for starting all types of reciprocating engines as well as variable voltage power supply for starting jet engines. The energizer is equally desirable for supplying electric power to aircraft before takeoff, for use in shop and hangar repair areas, and for facilitating production tests on jet engines and aircraft.

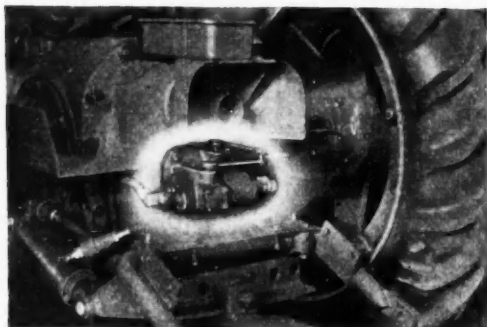
Basically, the equipment consists of a 28 1/2-volt, 500-amp continuous generator with the associated control mounted atop it. The energizer is also available with an induction motor drive for stationary mounting, or mounted on a two-wheel dolly for convenient manual handling, or with a gasoline engine drive mounted on a pneumatic-tired trailer for towing via truck or tractor.

A feature of this energizer is the "soft start" provided by the control, which minimizes strain and shock on the starting mechanism. In addition, the zero-voltage start eliminates heavy inrush currents to the starting motor of a jet engine. Another feature is the provision made for pre-selecting the proper current for jet engine starts by three constant current taps—650, 800, and 1000 amps. Furthermore, the regulated voltage, adjustable from 28 to 35 volts, permits the energizer to be used at proper voltages for line drop compensation between the energizer and the connected load. Adequate cooling is provided by a fan built integrally with the rotor. Voltage suppression eliminates radio interference in the airfield area.

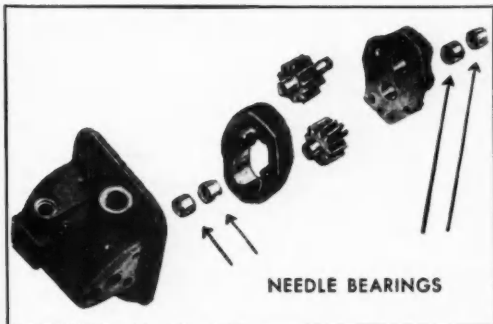
Convenient grouping of readily-read dials of the control increases operator efficiency. Throughout, the equipment is of drip-proof construction, for dependable operation.

Torrington Needle Bearings

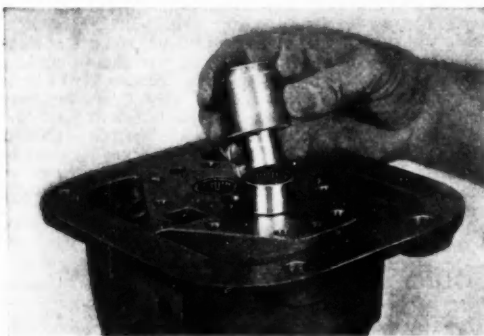
Pack More Power Into Hydraulic Gear Pumps



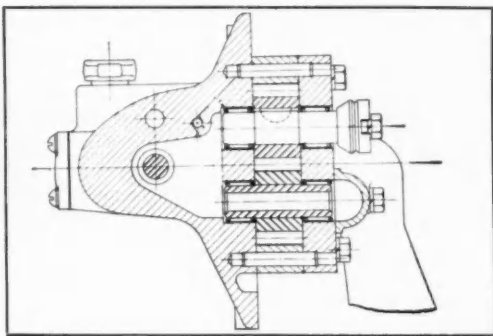
The swift-acting, powerful hydraulic control unit on J. I. Case tractors depends upon a high-efficiency, high-capacity gear pump. To maintain close internal clearances and good alignment, Case has developed an excellent design incorporating Torrington Needle Bearings.



Exploded view of the pump is shown above. Four "Precision Series" Torrington Needle Bearings provide the ultimate in internal pump clearances and match the high accuracy of the other pump parts. By reducing wear, they help assure peak mechanical efficiency and long service life.

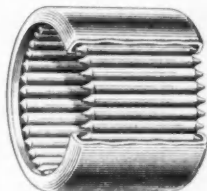


The small diameter and retaining feature of Needle Bearings simplify design and assembly. Installed by an arbor press, Needle Bearings take a firm press fit in straight-through housings, need no retaining devices. They use the hardened and ground shafts as inner races.



Cross-section of the pump shows the compact design secured. Needle Bearings permit the use of larger and stiffer shafts with short housing width, minimizing deflection. Adequate surface is provided for sealing at the ends of each gear without lowering pump efficiency.

In designing gear pumps for automotive, aircraft, farm, construction and industrial equipment, use Needle Bearings to secure the best features of pump design. Our engineers will gladly assist you in analysis of designs and bearing recommendations. Write us today. THE TORRINGTON COMPANY, Torrington, Conn., or South Bend 21, Ind. District offices and distributors in principal cities of United States and Canada.



TORRINGTON NEEDLE BEARINGS

Needle • Spherical Roller • Tapered Roller

Straight Roller • Ball • Needle Rollers

Oldsmobile's Rocket Engine

(Continued from page 30)

Pistons then are routed to a self-contained plating machine of continuous automatic type for tin-plating, the coating being about 0.0004 in. in thickness.

After plating the piston pin holes are precision-bored in a double-end machine of three-station type, holding three pistons at a time. The tools at one end do the boring, the other end cuts the retainer spring groove. All tools used in this machine are diamond tipped. The holes then are bearingized.

This completes the machining stages and pistons now must pass final gaging inspection. The operation is handled in another of the automatic cycle air gaging machines, combining functions of inspection and grading for size. At the end of the cycle the machine stamps the classification codes indicating the grading of skirt diameter and piston pin size.

Piston pin classification is given in four grades in steps of 0.0001 in. The skirt is graded in eight sizes in steps of 0.00025 in.

Another gage of similar design checks for parallelism of the axis of piston pin holes in relation to the top of the piston. A feature of this machine is that the base is surfaced with cemented tungsten carbide while the gaging spindle has an insert of the same material, mounted horizontally, to eliminate errors due to wear.

Consider now the machining of connecting rods. These are received as rough forgings with cap integral. The first operation is rough-grinding both sides of both ends in an enormous four-station surface grinder. Grinding is done one side at a time, the operators turning the forgings over in the same fixtures as one side is completed.

The next operation completes the preliminary locating operations which guide all machining stages. At this point the rods enter a surface broaching machine for rough-finishing the weight bosses at upper and lower ends, cutting bolt bosses to length, and broaching the side of bolt bosses at the lower end to width.

Rough-drilling of both ends follows in a vertical multiple spindle drill, the crank end being drilled in elongated form in two operations. At the same time the pin end is also rough-reamed. The next machine, also of multiple spindle type, drills and reams the bolt holes at the lower end.

At this point the bearing cap is parted from the rod by a surface broaching operation, using a saw-type broaching tool on each side. A drum type machine of multiple station type then mills the anchor slots and counterbores for the squirt hole in the wall at the lower end of the rod.

Illustrated here is a large drum type machine with horizontal heads, notable for the fact that it performs a minor but troublesome operation. Its function is to spot-face one side of the lower end wall at an angle on an angular face. This is done by means of a long but massive spindle reaching from the opposite end of the machine, as shown. The operation is quite equivalent to end milling, although it is done with a drill point. The oil squirt hole is drilled through with a spindle directly at that point.

The long oil hole through the rod is drilled in a battery of single-spindle sensitive drill presses. Bolt holes are finish-reamed and the initial assembly of rod and cap is made, taking up the fastenings by means of calibrated torque wrenches. It may be noted that from the time the cap was parted from its rod both parts were kept together in pairs to assure proper matching.

The piston pin hole is finish-reamed and the crank end semi-finish-bored followed by chamfering of both sides of both ends.

At this point the rod enters a special vertical machine of two-station type: the first station presses the bronze bushing in the pin end, the bushing being burnished and chamfered at the second station.

Before proceeding to the final operations the rod is weight balanced. First it is weighed at each end to determine the amount of stock removal necessary; then it is mounted in the special milling machine for removal of excess weight. Milling is done on the previ-

ously rough broached weight bosses at both ends, final weight being held to a total tolerance of four grams.

Final stages include the finish-grinding of both sides of both ends in the same type of four-station surface grinder used at the first operation. Then the piston pin bushing and the big end bore are precision bored in a single-end precision boring machine of three-station type, holding three rods at a time. The rods are mounted in vertical position in the fixture, boring being done for both ends simultaneously. They use diamond tools for boring the piston pin bronze bushing; cemented tungsten carbide tipped tools for boring the big end. Following this the big end is finish-honed in a two-spindle vertical microhoning machine. Here the fixtures are arranged to hold two rods at a time to prevent bell-mouthing of the bore.

One of the most interesting features of the connecting rod line is the line-up of final inspection operations on the benches. It is a 100 per cent inspection with individual stations for each step, the work being transferred from one to the next by means of inclined chutes connecting the stations. First step is to mount the rod horizontally in a fixture provided with an air line for blowing through the long oil hole. This removes all chips and foreign material and assures that the hole is open. At the next station the operator chamfers both ends. The succeeding station is provided with an air gaging machine for checking the diameter of the large bore, its squareness with one face, and thickness and parallelism of both sides of the lower end. The last station is equipped with an air gaging machine which simultaneously checks the parallelism of large and small bores and their center distance.

New Gould Battery Grid Design

(Continued from page 35)

performing a certain amount of work, and further that this separation was caused by voids and porosity invariably present in the grid framework. This porosity presented weak spots which permitted the sulphuric acid of the electrolyte to attack, and finally separate, grid members.

After months of theoretical research and practical experimentation, two factors were developed which are said to decrease grid porosity 90 per cent. The two factors so affecting the life of the storage battery are: (1) a new grid design, and (2) a new casting process.

The new grid design differs from the old in that the lattice work comprises fewer vertical and horizontal members than the old grid, and all cross members are the same size and shape.

These design factors are important because it was found that considerable porosity occurred at the intersection of

members, and particularly where fine members intersected heavy members.

The new casting technique includes: Smaller openings for pouring lead into the molds; higher casting temperatures; close control of the mold temperature as the lead cools; and pouring into the mold from the top rather than from the side.

These practices prevent porosity by controlling the sequence in which grid members freeze. Formerly, outer grid members could freeze before inner members froze, and consequently porosity would result when the inner members shrunk while cooling. By pouring into the mold from the lug at the top of the grid, rather than from the side, shearing of flash was eliminated. Formerly, this shearing operation exposed edge porosity to the electrolyte and hastened separation of the outer grid framework.

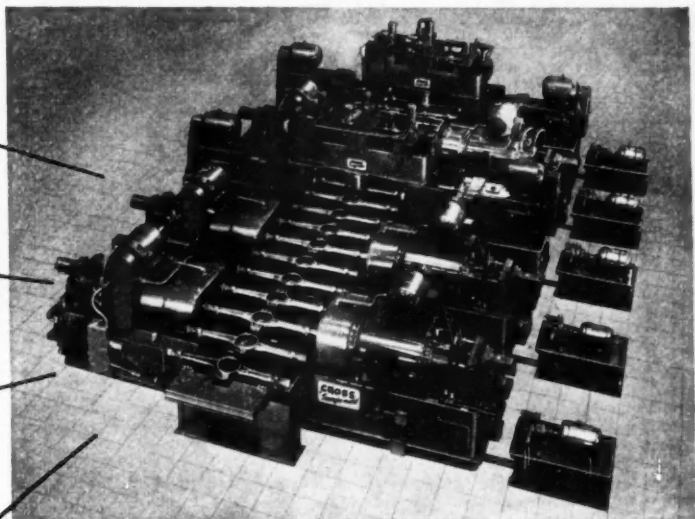
CROSS TRANSFER-MATIC

150
AXLE HOUSINGS
PER HOUR WITH
1 OPERATOR

LOWER
CAPITAL
INVESTMENT

EXCEPTIONAL
FLEXIBILITY

SIMPLIFIED
MAINTENANCE



Another cost-cutting application

of **VICKERS**
HYDRAULICS

The Cross Transfer-matic illustrated here uses Vickers Hydraulic Controls in making substantial reductions in the cost of machining axle housings.

A hydraulic transfer mechanism automatically advances the housings (two at a time) from one machine to another. Hydraulic circuits of the individual machines provide for correct progressive positioning and clamping together with the traversing and feeding of the tool slides. Interlocks assure accurate positioning and secure clamping before cutting operations begin . . . also clearance of all tools before transfer to next station.

Exceptional flexibility is provided in that machines can be added, removed or shifted. Transfer mechanism is independent and moves work only from machine to machine. Locating and clamping are done by work holding fixtures integral with each machine.

Indicative of the many advantages of Vickers Hydraulics are gasket mounted Vickers Control Valves that simplify installation, save space and make adjustment easier. Vickers Power Units are compact "packages" that simplify hydraulic system design and reduce costs.

Vickers Hydraulics are particularly adapted to provide the complex motions and operations needed in highly automatic machines. Get in touch with the Vickers Application Engineering Office nearest you for information on how Vickers Hydraulics can improve your machinery.

VICKERS Incorporated

DIVISION OF THE SPERRY CORPORATION

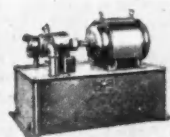
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ENGINEERS AND BUILDERS OF OIL HYDRAULIC EQUIPMENT SINCE 1921

AUTOMOTIVE INDUSTRIES, October 1, 1949

Representative Vickers Hydraulic Pumps and Controls Used on Cross Transfer-matic



Power Unit, Bulletin 46-43a



4-Way Valve, Pilot Operated, Solenoid Controlled, Bulletin 48-27



Flow Control Valve, Bulletin 45-35



Sequence Valve



Check Valve



Pressure Reducing Valve

3989

Continental Diesel Engines

(Continued from page 27)

ing rod, piston and rings—are entirely interchangeable. This is also true of accessories drive and fan.

The engines are designed for use with hand inertia starters or a 12-volt starting system. They will start by hand at 35 F without starting aids.

High fuel economy is claimed for these engines—0.47 lb per bhp-hr for the 4-cyl, and 0.495 lb per bhp-hr for the two-cyl—including all accessories.

The crankshaft is nitrided—double-throw with two main bearings for the two-cyl engine, four-throw with three main bearings for the four-cyl engine. The large diameter, thin-web flywheel weighs 23 lb, is dynamically balanced and secured with bolts to the crankshaft. The camshaft is a one-piece alloy casting.

Special attention was paid to the symmetry of gear drives, the camshaft being driven directly from the crankshaft gear below and driving the oil pump mounted at the end of the case. Directly above the crankshaft is the drive to the Bosch pumps and governor while a quill serves as the drive for the vertically-mounted, axial-flow cooling fan of 700 cfm capacity. The fan, mounted on a tower, forces air vertically downward and discharges it into an aluminum cowling where it flows through cylinder baffles and past the cylinders.

The power take-off at the flywheel end consists of a step-up ratio from the end of the crankshaft—57/38 on the 4-cyl, and 63/32 on the two-cyl engine—to give a maximum speed of 3600 rpm. The take-off driven gear is mounted on two, single row MRC 208 ball bearings. Rotation of the power take-off is clockwise, viewed at the take-off end.

Through bolts located at each diaphragm, and bolts through a flange on the upper half of each side of the case and below the flywheel housing secure the two halves of the crankcase with a split line parallel to the center line of the crankshaft. Oil pan and accessory case are one-piece aluminum alloy castings attached to the case with studs. Exhaust manifolds are of welded stainless steel tubing.

Pistons are of aluminum alloy with four rings—the top ring being chromium-plated, then two plain rings, and a ventilated oil ring below. A relatively high compression ratio—17 to 1—is a feature of these engines. Each cylinder is provided with one exhaust and one intake valve, the valves being actuated through a rigid push-rod and rocker arm. Quietness and zero valve clearance are effected by means of Wilcox-Rich hydraulic valve tappets.

Inserted valve seats are used for in-

take and exhaust valves, the exhaust seat being faced with Stellite. Two nested valve springs are used for each valve.

Cylinders are mounted on opposed surfaces of the crankcase and are held through the cylinder base flange by four studs and two through bolts. Each cylinder has an injection nozzle on the upper side, the nozzle discharging into the combustion chamber directly below the exhaust valve crown. Spray is directed into an energy cell of the Lannova single-cell type, located between the push-rods in the under side of the cylinder.

The injection pump is of single-plunger type discharging a metered quantity of fuel for each stroke. It also contains a centrifugal-mechanical governor used for controlling engine speed through variable metering of fuel.

A positive displacement pressure oil pump is integral with the accessory case and driven by the camshaft as noted earlier. It is fed by a short tube from the oilpan and provides full pressure feed lubrication to all bearings. A spring-loaded relief valve regulates oil pressure between 30 and 40 psi. The system also includes a low oil pressure shut-off device.

Precision Casting

(Continued from page 44)

plastic residue and volatile matter from the refractory flasks. The flasks are now completely cured and are ready for the metal charge. For this operation, the company uses either automatic horizontal centrifugal casting machines or a vacuum casting setup of its own design. The use of either technique depends on the particular parts being cast.

In preparation for casting, the company has developed a simple technique for the induction heating of the metal in a crucible. When the proper temperature has been attained, the centrifugal machine is started and the molten metal caused to flow from the crucible into the mold by centrifugal force. Where the design of the parts permits, casting is done under vacuum rather than centrifugal force.

After the metal has cooled, the clusters are shaken out and parts are cleaned and given a smooth finish by a fine sand blasting operation. Finished casting are then removed from the sprues by cutting with high speed abrasive cut-off wheels. Average run of rejects is about 10 per cent for close dimensional parts.

Due to the nature of this process, certain limitations are placed on the size of the parts that can be cast. In general, a five lb limit should be considered on parts made by this method.

One of the major advantages claimed for the process is its ability to cast metals heretofore considered impossible due to extreme hardness and high melt-

ing point. Many varieties of SAE mild steels and stainless steels have been cast satisfactorily. In addition, parts have been cast from vanadium steels, tool steels, and other high alloy steels. In the non-ferrous field, Electronicast has been used successfully in casting beryllium copper, brass, aluminum, aluminum alloys, and manganese bronze.

Tolerances on parts can generally be held to plus or minus 0.005 in., for pieces of moderate shape. Highly intricate shapes may require slightly greater tolerances.

Valve Lifters

(Continued from page 41)

chute carefully segregated, it is a simple matter to find the cause of rejection when rejects are screened for salvage or scrap.

In addition to the Gogan hardness tester, Buick has installed an enormous automatic inspection machine for checking all significant dimensions of valve lifters. This is the Sheffield machine illustrated here. It has a number of checking stations to which the parts are presented on a tiny conveyor belt. Checking for OD and bore tolerance is done with the new Sheffield Airelectric gaging units.

The following significant elements are scanned automatically by this machine: Outside diameter; Taper on the OD; Bore; Depth of two stepped bores; Overall length; Roundness of OD; and Squareness of foot with body.

The front face of the machine, under the gaging stations, contains a series of 14 chutes representing specific cause for rejection at the various stations. The rejects are collected in trays for examination and salvage or scrap later on. Accepted parts continue on the conveyor and out of the machine.

Centrifugal Casting

(Continued from page 40)

physically of the same size to fit the centrifugal casting machines interchangeably. Molds are machined from sections of standard eight-in. diam steel bars, the cavity being finish-machined in accordance with the dimensions of the specific part.

Centrifugal casting machines are arranged in two bays, each one served by a Lectromelt electric furnace, where the final composition and temperature control are obtained. The furnace is fitted with a teapot type spout for pouring. Molds are spun in horizontal position, the speed of rotation being adjustable as desired. Each of the centrifugal casting machines has a holding pot for the molten metal, the volume of the cavity being manually adjustable

(Turn to page 68, please)



JANUS had a Two-Way Job
so has

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ENGINEERING

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PRODUCTION

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THESE UNITS FORM BORG-WARNER. *Executive Offices, Chicago:* BORG & BECK • BORG-WARNER INTERNATIONAL • BORG-WARNER SERVICE PARTS • CALUMET STEEL • DETROIT GEAR • DETROIT VAPOR STOVE • FRANKLIN STEEL • INGERSOLL STEEL • LONG MANUFACTURING • LONG MANUFACTURING CO., LTD. • MARBON • MARVEL-SCHLEBLER CARBURETOR • MECHANICS UNIVERSAL JOINT • MORSE CHAIN • MORSE CHAIN CO., LTD. • NORGE • NORGE-HEAT • PESCO PRODUCTS • ROCKFORD CLUTCH • SPRING DIVISION • WARNER AUTOMOTIVE PARTS • WARNER GEAR • WARNER GEAR CO., LTD.

Technical Highlights of the 1949 National AIR RACES

Cleland paid only a few hundred dollars for a Goodyear F2G-1 Corsair fighter to obtain the carburetor from its engine for installation in his own Corsair. Ron Puckett, oil salesman from Lansdowne, Pa., had only a few hundred dollars with which to prepare

(Continued
from page
33)

his airplane and borrowed the money

American Steel & Wire Navy Jet Race

Carrier U.S.S. Midway off N.Y.C. to Cleveland, Ohio—432 miles

Pilot	Plane	Engine	Av. Speed
1. Lt. R. S. Laird	McDonnell F2H-1 Banhee fighter	(2) Westinghouse J-34-WE turbojet	548.978 mph
2. Lt. Comdr. W. D. Biggars	McDonnell F2H-1 Banhee fighter	(2) Westinghouse J-34-WE turbojet	544.805 mph
3. Lt. T. S. Sedaker	McDonnell F2H-1 Banhee fighter	(2) Westinghouse J-34-WE turbojet	538.776 mph
4. Lt. E. A. Buxton	McDonnell F2H-1 Banhee fighter	(2) Westinghouse J-34-WE turbojet	509.601 mph

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Strom has been making precision metal balls for over 25 years for all industry and can be a big help to you in selecting the right ball for any of your requirements. In size and spherical accuracy, perfection of surface, uniformity, and dependable physical quality, there's not a better ball made.

Strom STEEL BALL CO.
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Largest Independent and Exclusive Metal Ball Manufacturer

for a new set of tires when one blew out on landing just prior to the race opening.

It was clearly evident that the pilots, crews and equipment came to the races far better prepared than previously. There were considerably less last-minute, all-night preparations than formerly and most racing planes stood vacant in the hanger or even parked on the apron until race time. A single exception was Anson Johnson, last year's Thompson winner, who brought a radical installation this year which required constant, urgent preparation until the warning signal was flashed for the big event.

Odom's "Beguine" was owned by Jacqueline Cochran Odlum and she had hoped to break the world's propeller-driven aircraft speed record after the races. The engine coolant and oil coolant radiators had been removed from the bottom part of the fuselage and ducted radiators installed at the wing-tips. Thus, by use of the familiar Meredith effect, not only was engine cooling obtained at no cost in drag but an additional thrust equal to two or three per cent of engine power was obtained. The installation had been intelligently done with smoothly-faired laminated wood diffusers and formed shells.

A major contributor to the speed of the "Beguine" was the extreme smoothness of its surface finish, essential to maintenance of low drag on its so-called laminar flow profile.

The airplane was powered by a Packard-built Rolls-Royce V-1650-7 "Merlin" engine on which only a few hours had been logged. This engine is rated 1590 hp at 3000 rpm but over-speeding to 3300 rpm and the use of triptane fuel brought this value up to about 2000 hp. The installation was masterful and new equipment throughout was much in evidence.

Cook Cleland's Thompson-winning Goodyear F2G-1 Corsair sported end plates this year. These were simply trimmed from about 0.25 in. aluminum alloy and screwed into a channel on the inner periphery of the tip. Cleland had previously cut 18 in. from the original span of the plane and this year removed a total of 29 in. This reduction in span, and particularly in aileron/wing span ratio produced greatly increased stick forces. Addi-

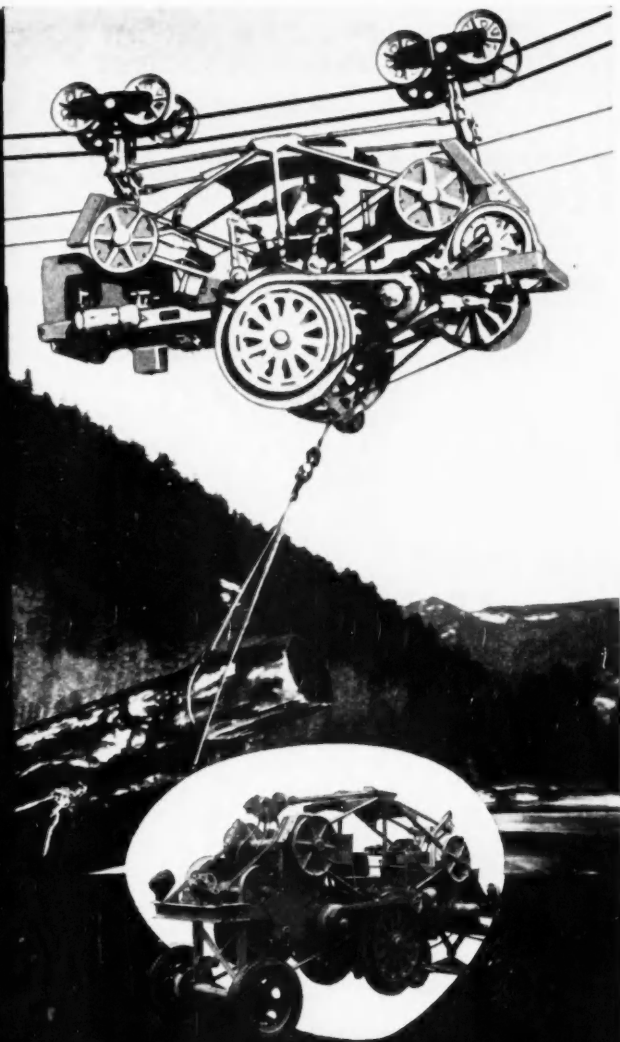
(Turn to page 62, please)



Spicer ENGINEERING *Solves the Problem*

Spicer's 45 years of experience in automotive power transmission engineering pays off in many ways. The SKY-HOOK is a typical example. It is a specially designed aerial vehicle for hauling heavy logs out of rough terrain where there are no roads or usual means of getting out timber. A motor-actuated drum at each end winds up the cable and pulls the vehicle in either direction along the trolley wires. When a change of location is desired, the SKY-HOOK is put on rubber-tired wheels and transported like a trailer. Three sets of Spicer Universal Joints, and one Spicer Brown-Lipe Auxiliary Transmission with top-mounted power take-off, help the SKY-HOOK snake 'em out with speed and economy!

SPICER ENGINEERING is available for the development and application of sound power transmission principles to all automotive needs.



The Spicer-Equipped SKY-HOOK is made by the Painter-Williamette Company of Portland, Ore., manufacturers of trailers and special rigs.



SPICER ENGINEERING produces Transmissions, Passenger Car Axles, Clutches, Parish Frames, Torque Converters, Stampings, Forgings, Universal Joints, Propeller Shafts, Spicer "Brown-Lipe" Gear Boxes, Railway Generator Drives.



SPICER MANUFACTURING
Division of Dana Corporation
TOLEDO 1, OHIO

1949 National Air Races

(Continued from page 60)

tion of the end plates provided an increased effective aspect ratio and, therefore, improved lateral control. It was for this reason that the end plates were added and not, as popularly reported, for added speed. Although Cleland reported a 10 mph speed gain as a result of the new installation, it is reasonably certain that knocking off 29 in. of span had something to do with it.

As an example of the type of "be-

tween races" work that the pilots accomplish, Cleland added a backfire door to his carburetor air inlet to forestall the difficulty that cost him the Thompson in 1948 when a backfire tore loose the entire air intake scoop not only on his own plane but on another entry in the same race.

Cleland also added a lengthy tail fairing, added turning vanes in the oil and intercooler air intake bends and greatly improved the fairness of the

carburetor air intake cowl aft of the firewall.

The entry of Anson Johnson also held technical interest in that he removed the belly radiator installation of his North American P-51 Mustang, as in the "Beguine", but went one step further and located it inside the wing near the root. Coolant radiators were located on both sides and the oil cooler was mounted in the starboard wing to assist in offsetting propeller torque. Special radiators were built for this installation, in order to fit within the wing profile. Air outlets were spanwise slots. The inlets were illogically small and Johnson could not taxi his airplane without overheating or permit his continuous airspeed to fall below a specific value. However, in working order, there remains little question but that Johnson's airplane is extremely fast and a most logical contender for future Thompson Trophy wins.

The Supermarine Spitfire Mk 14, only foreign entry in the Races, proved a bitter disappointment, not only to its sponsors and pilot but to many technical observers as well. Firstly it had been erroneously listed as a "525 mph" aircraft in the official program, a gross exaggeration in view of its officially listed top speed of 390 mph at sea level. (It is capable of 450 mph but at 25,000 ft.—not sea level). J. H. G. McArthur, former R.A.F. officer, had qualified at 370.11 mph but it was too readily assumed that he was "holding back." In its only race, the Tinnerman, the Mk 14 averaged only 359.565 mph to take third place. The plane is powered by a Rolls-Royce Griffon 65 engine of 2375 hp at 2750 rpm and driving a five-blade Rotol 11 ft. constant-speed propeller. McArthur had not received delivery of the plane until August and therefore flew it in full military condition, including VHF radio equipment, two-speed, two-stage supercharger, etc.

The Bendix Trophy Race was won by the North American P-51 entered by screen star Jimmie Stewart and flown by Joe De Bona. It was fitted with an experimental hand-forged Hamilton Standard four-blade propeller which had been rejected by the Air Force because it had not been designed for long life. Its aerodynamic characteristics are of advance design however. De Bona's Mustang had received 48 coats of finish, each carefully sanded and sealed. Although De Bona claimed that this finish added only 8 mph to his top speed, his average true airspeed of 448 mph is considerably above the standard military version at maximum gross weight. De Bona and Stewart had added 580 gal of fuel tankage to the airplane and it took off with a total fuel load of more than 5000 lb. De Bona flew the entire 2000 miles at 3000 rpm with manifold pressure varying between 63 and 67 in. Hg., or well over maximum power. He flew at 25,500-27,000 ft all the way.

(Turn to page 64, please)

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Tandem Bike...



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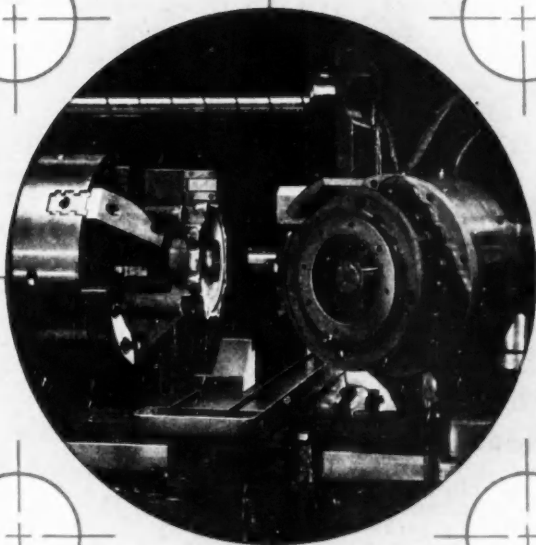
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A case in point is *multiple drilling*; the tool that does the trick is the P&J self-driven Multiple Spindle Drill Head. It drills, countersinks or reams any number of holes to precision specifications for size, location and alignment — all in the one holding, as the conventional part of a sequence of high speed, fully automatic chucking and turning. That's P&J Tooling on the P&J Automatic! They

team-up together to combine cuts . . . to reduce machining time . . . to eliminate extra work handling . . . to save time and money. Production Tooling Headquarters will engineer your tooling for better work, and more of it at the lowest cost per unit. Get a P&J cost and time estimate, and compare. Simply send sample parts or prints; there's no obligation.

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Pawtucket, R.I.

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Division Niles-Bement-Pond Company



AIR RACES

(Continued from page 62)

With no significant new Goodyear Trophy racers entered this year it was veteran S. J. "Steve" Wittman's same two entries that paced the field. Wittman had added wheel pants to his "Buster" and "Bonzo" entries and made improvements in the engine cowlings. On his own "Bonzo" racers, Steve mounted a new scimitar-shaped, laminated wood propeller, in contrast to

the straight, metal propellers used on most other racers. Wittman's theory in this shape, which worked out well in practice, is that on takeoff, the heavy thrust load twists the ends of the scimitar producing a lower pitch, and therefore higher engine speed, than normal. Once up to cruising speed—better than 200 mph on only 85 hp—this load is relieved, the ends of the blade return to high pitch and, in effect, a two-position propeller has been achieved. The significance of this effect in racing is that, given everything else even, the first plane off the ground will win the race and the importance of quick take-

off was demonstrated again and again in the eight Goodyear races. Steve's failure to win the final resulted from his engine running about 150 rpm under its best in the final race but his other entry, piloted by Bill Brennand, captured the event.

Aside from the LeVier "Cosmic Wind" entries, previously described, only two other Goodyear entrants showed technical merit. These were the Williams Special, flown by Clifford Mone, and the Sorensen Special, flown by its builder Keith Sorensen. These aircraft represented the two classic layouts of the Goodyear racers, the former a low-wing design and the latter a mid-wing design. The advantage of the latter arrangement lies in the coincidence of the cylinder head fairing and wing plane, comprising only a single excrescence, whereas the low-wing design requires separate "entries" of engine cowl and wing. But the outstanding feature of both of these simply-designed craft was surface smoothness, particularly the Sorensen craft. After all that has been written in the technical literature on the merits of surface fairness, it is astonishing, at least to this observer, that much greater attention is not paid to this simple but invaluable design and fabrication trick.

As in the previous two runnings of the Goodyear classic, the field was replete with surprisingly amateurish designs of unskilled workmanship. Although aerodynamics embraces a body of exceedingly complex mathematics, its essence lies simply in beauty of line and it is one of the perplexing aviation mysteries that racing plane builders have not yet learned this simple lesson. Tortuous angles, polygon-shaped fuselages, sagging fabric over warped longerons and ribs, etc., were as much in evidence this year as in previous years. While this "backyard" technique is much ballyhooed by the race sponsors, it seems fundamental that the purpose of individual builder expense is to win prize money and this is incompatible with the approach to the problem taken by the great majority of the entrants.

Goodyear Trophy entrants were allotted 100 gal of either 80 or 91 octane fuel by the Standard Oil Co. of Ohio, together with a detergent or winter grade oil, the selection in both cases being that of the entrant. The wiser pilots used only the 80 octane fuel since the slower-burning qualities of the higher octane fuel held no advantage in the contest to obtain the highest engine speed. The Continental C85 engines, rated at 2600 rpm, were turned at from 3300 to 3600 rpm by the winning pilots and such over-speeding could hardly be obtained by heavily-loaded fuels.

A tempest in a teapot was created when the news "leaked" that LeVier & Associates had modified the "Cosmic Wind" entries to burn alcohol. Although the official rules clearly state: (Turn to page 67, please)

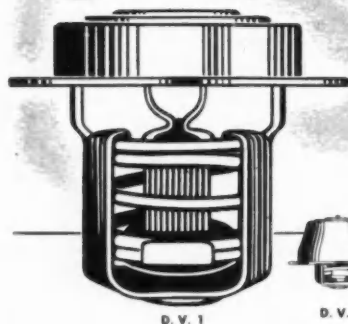
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D. V. 1



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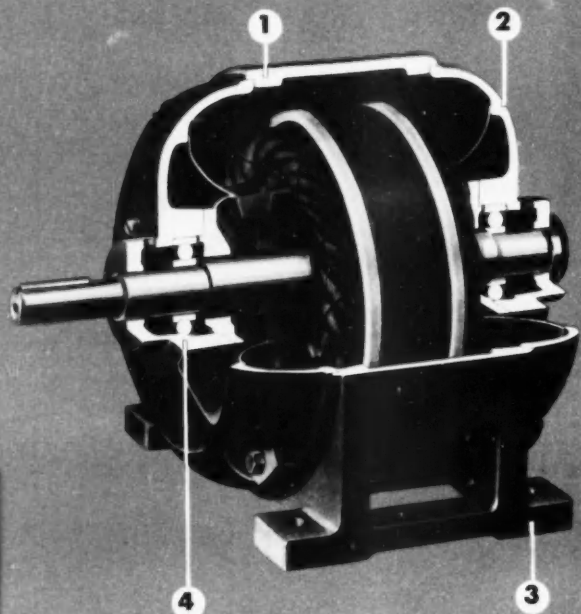
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GENERAL  ELECTRIC

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Look at the solidity of a Tri-Clad's thick-section cast-iron frame (1) and heavily reinforced end shields (2) . . . its heavy integrally cast feet (3). Do you wonder we say "Tri-Clad gives you structural strength and rigidity no other general purpose motor can match"? Notice, too, the completely enclosed bearings (4). A Tri-Clad motor will run safely without relubrication for years—as long as any general-purpose motor you can buy. Yet it's grease-gun easy to lubricate if you ever need to.

You can't twist a **TRI CLAD** motor out of line

Try as a heavy-muscled mechanic may, he can't twist a Tri-Clad motor frame when bolting it to an uneven surface. The bolt will snap before he can pull that rigid cast-iron structure out of line.

Important? It's one of the basic reasons General Electric believes cast iron to be the ideal structure for general-purpose industrial motors. Other reasons? Cast iron has unusually high resistance to rust and corrosion. It has an inherent damping action that minimizes resonance. And . . . it won't take on an injurious permanent "set" as a result of accidental blows or mechanical abuse.

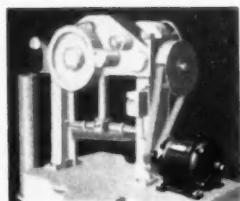
Want a motor that's been **SERVICE-PROVED** in 5 billion hours of rugged industrial use? Nearly all types and ratings are **AVAILABLE FROM STOCK**.

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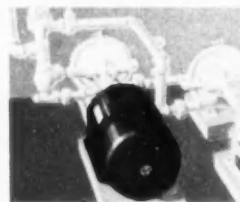
GENERAL  **ELECTRIC**

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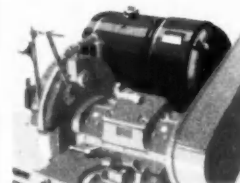
YOU CAN'T BEAT **TRI CLAD** REG. U.S. PAT. OFF. **EXTRA PROTECTION**



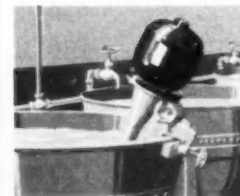
G-1 open (dripproof) induction motors for constant-load, constant-speed applications. From 1 to 2000 hp.



G-2 totally enclosed motors for outdoor operation, in abrasive dusts, or corrosive fumes. From 1 to 1000 hp.

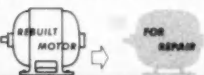


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G-4 flange and face-type motors for use where the machine supports the motor, or vice versa. From 1/20 to 60 hp.

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MOTOR EXCHANGE PLAN

Look for this **EXTRA**
on the motor you buy!

Air Races

(Continued from page 64)

"Any type of fuel may be used," Tony LeVier voluntarily withdrew his scheme in a sportsmanlike gesture.

For the high-powered aircraft, Sohio provided up to 400 gallons of a 130/170 blend prepared especially for the events this year. This fuel contained 4.34 ml of tetraethyl lead and produced 19,100 Btu per lb. This fuel was used by all of the contestants except Cleland and Odom, who used triptane with about 4 ml of lead added. Triptane has a performance number of roughly 200/300 but is so slow-burning that it can easily burn out the engine in which it is used continuously.

All contestants were equipped with injection equipment. The three Good-year F2G racers used standard Pratt & Whitney injection fluid made up of 50-50 methanol-water with a slight amount (less than one per cent) of oil added as a corrosion-inhibitor. It is of interest to note that, although wartime addition of alcohol to the water was as an anti-freeze for high altitudes, its use at sea level in these racers served as a refrigerant for added cooling of the engines. The amount of water injection varied widely according to the "secret formula" of the individual. Injection rates varied from 1.9 to 2.8 gallons per minute, which, for the 45 minutes of the race, required from 90 to 125 gallons of water be carried in the airplane. So basic has water-injection become at the races that, for example, the two J. D. Reed entrants, a Mustang and a Lockheed P-38 fighter, had their carburetors permanently set for water injection, making it necessary to use water in order to operate the engines.

Cook Cleland equipped his airplane last year for "stabilized" hydrogen peroxide injection. As to how he accomplished this stabilization is a much-debated point for hydrogen peroxide quickly decomposes into water when exposed to the atmosphere. This equipment was installed this year but Cleland did not use it in winning the Thompson classic.

Remarkable performances were registered by the engines this year with only Anson Johnson being forced out of the race due to engine difficulties (blown exhaust stacks and oil-line rupture). Although the Pratt & Whitney R-4360-3 engines used in the F2G racers were designed for 3000 hp on 100 octane fuel, Ron Puckett, second place Thompson winner, operated his engine at 61 in. Hg. at 2800 rpm to develop 3800 hp and Cleland boosted his to 65 in. Hg. at 2800 rpm and developed 4000 hp. Both engines functioned smoothly throughout the 30-45 min required for the race, although Pratt & Whitney engineers admit their inability to obtain this range of power from even their late-model Wasp Majors. These latter are, of course, designed to meet rigorous A-N tests

but the performance of these early, wartime engines at Cleveland indicates something of the possibilities. Standard valve timing and ignition advance was used by all contestants.

Stored Tooling

(Continued from page 42)

accomplished in five operations. The tool is first spray painted with standard fast drying enamel after all machine surfaces have been adequately greased. The second operation consists

of applying standard three-quarter in. masking tape to the tool in six in. squares as shown in Fig. 1. The tape acts as a foundation for the webbing agent applied in the third operation but is not necessary providing the space to be covered is small in area. The webbing agent, also a strippable plastic coating, is applied by spray gun equipped with a fluid tip and needle under approximately 60 psi from mechanically agitated pressure tanks. The webbing agent, having characteristics similar to a spider's web, fills in the voids between the bands of masking tape, as shown in Fig. 1. The fourth

(Turn to page 70, please)



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Centrifugal Casting

(Continued from page 58)

to suit the requirements of the individual part.

From the standpoint of melting practice, work is put through in large batches, the parts being so selected as to use the same type of primary cupola metal. Variations in alloy composition are then adjusted in the electric furnaces. In some special cases still further changes in composition can be ef-

fectured by making alloy additions in the ladle.

Control is paramount here and is a function of the metallurgical laboratory. In general practice, the cupola is charged and started before the beginning of the first shift and a sample of the melt immediately analyzed in the laboratory. Meanwhile, the electric furnace is charged and a sample of the alloy is drawn off and rushed to the laboratory for analysis before the casting crew begins to pour. Thus an initial check on the composition is made before the day's first run of castings is started.

From that point on samples of metal are prepared every half hour and delivered to the laboratory for analysis. Similarly, each hourly batch of castings is marked to indicate the hour, thus providing identification after the sample analysis has been made by the laboratory. Any batch that is off-analysis can be recalled and rejected for remelting.

The company has a good sized battery of heavy duty lathes and boring mills for the rough machining of castings, particularly castings for piston rings for those customers who specify machining on their sleeves.

Production capacity for one shift is approximately 5000-6000 average size cylinder liners and the same number of piston ring pots that will make about 60 rings per pot.

Proof of the ~~Pudding~~ Product

- ✓ Low Cost
- ✓ Low Scrap (approx. 2%)
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- ✓ Extremely Long Wearing
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Centrifugally cast electric alloys — exclusively heat-treated for Super Duty

CALENDAR

Conventions and Meetings

- British Passenger Car Show, London, Sept. 28-Oct. 8
- Nat'l Defense Transportation Assoc., Atlanta, Oct. 3-5
- Nat'l Lubricating Grease Inst., New Orleans, Oct. 3-5
- Society of Industrial Packaging and Materials Handling Engineers Annual Exposition, Detroit, Oct. 4-7
- SAE Nat'l Aeronautic & Aircraft Eng. Display, Los Angeles, Oct. 5-8
- Paris Auto Show, Paris, Oct. 6-16
- Amer. Soc. for Testing Materials, Pacific Nat'l Mfg., San Francisco, Oct. 10-14
- Amer. Society for Metals Nat'l Metal Congress & Exhibition, Cleveland, Ohio, Oct. 17-21
- Amer. Welding Soc. Annual Mtg., Cleveland, Oct. 17-21
- Amer. Inst. of Mining & Metallurgical Engineers Metals Br., Cleveland, Oct. 17-21
- 10th Annual Mtg. & Dinner Automobile Old Timers, New York City, Oct. 18
- Nat'l Safety Council Safety Congress & Exhibit, Chicago, Oct. 24-28
- Nat'l Metal Trades Assoc., Annual Convention, Chicago, Oct. 26-28
- Amer. Soc. Tool Engineers Semi-Annual Mtg., Montreal, Oct. 27-29
- SAE Diesel Engine Mtg., St. Louis, Nov. 1-2
- Amer. Society Body Engineers Annual Tech. Convention, Detroit, Nov. 2-4
- SAE Fuels & Lubricants Mtg., St. Louis, Nov. 3-4
- Chicago Auto Show, Chicago, Nov. 4-12
- Society for Experimental Stress Analysis Annual Mtg., New York, Nov. 20-Dec. 2
- SAE Annual Mtg., Detroit, Jan. 9-13
- Plant Maintenance Show, Cleveland, Jan. 16-19
- Nat'l Auto. Dealers Assoc., Atlantic City, Feb. 5-8
- Nat'l Auto. Access. Mfrs. Assoc. Annual Expos., New York City, Feb. 6-19
- Pacific Automotive Show, San Francisco, Feb. 16-19
- Amer. Road Builder's Assoc., Cincinnati, March 6-9
- SAE-Passenger Car Body & Production Mtg., Detroit, Mar. 14-16
- Amer. Soc. Tool Engineers Industrial Expos., Phila., April 10-14
- SAE Aeronautic & Aircraft Eng. Display, New York City, April 17-19
- 3rd Highway Transportation Congress, Washington, Apr. 26-27
- International Motor Show, Turin, Italy, May 4-14
- Automotive Engine Rebuilders Assoc. Annual Convention, St. Louis, May 18-19

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Stored Tooling

(Continued from page 67)

operation consists of applying the first coating of the plastic after the webbing agent has dried. This is done using the same type of air spray equipment. The application of the first coating, as shown in Fig. 2, is fairly light to avoid too much initial weight on the webbing. All sharp corners and inaccessible crevices are then sealed with Pliofilm tape.

The final operation consists of applying a second heavier coating of the liquid plastic which builds the overall thickness of the covering up to approximately 1/16 in. The two coatings may, if desired, be of different colors obtained by adding pigments, to assure a complete covering. Further steps may also be taken, if necessary, to assure complete dehydration of air within the enclosed tool. This is accomplished by placing bags of dehydrating agent, such as silica gel, within the enclosed tool together with a humidity indicator behind a sealed Pliofilm window. Approximately three changes of dehydrating agent will be necessary to completely dry the enclosed air. Measurement of water content in the dehydrating agent, when removed, will be an indication of insufficient cover.

Plastic patterns by the nature of the material used in their fabrication are exceedingly difficult to store unless placed flat. Application of strippable plastic coatings to plaster patterns on an experimental basis proved unsatisfactory since the plastic has a slight adhesive quality which pulled away particles of plaster when removed. This was overcome by first applying a thin coating of lard oil, by hand brush, to the plaster. This prevents the plastic from adhering to the plaster and has no effect on the plaster itself. The application of the plastic coating is the same as is used on jigs and fixtures except for the taping and webbing operations which are not required. Plaster patterns so treated may be stored in open areas indefinitely without suffering the effect of weather and are not susceptible to damage normally incurred when stored in racks.

The advantages of using strippable plastic coating stem largely from the ease and speed with which tools so treated may be prepared for reuse. The plastic covering may be readily cut with a knife and removed in a few minutes, making the tool ready for productive use. Strippable plastic coating as a preservative for tools is an inexpensive method for preventing deterioration due to weather when initial cost of the items involved is considered. The cost of the materials used does not exceed that of a good enamel paint. The equipment required is simple and inexpensive to operate. Furthermore, it is not necessary to re-preserve, periodically, items so covered.

Business in Brief

Written by the Guaranty Trust Co., New York, Exclusively for
AUTOMOTIVE INDUSTRIES.

General business activity declined slightly during the week ended Sept. 10, as a reflection chiefly of the Labor Day holiday. Department store sales, electric power production, railway freight loadings, crude oil output, and bituminous coal production were lower than in the preceding week, while construction advanced. The New York Times index of activity for the week ended Sept. 3 stands at 140.5, as compared with 142.7 in the preceding week and 147.4 a year ago.

Sales of department stores during the week ended Sept. 10, as reported by the Federal Reserve Board, equaled 27.1 per cent of the 1935-36 average, as compared with 29.1 in the week before. Sales were four per cent below the corresponding distribution a year ago, as against a preceding decline of five per cent. The total in 1949 so far reported is five per cent less than the comparable sum in 1948.

Electric power production declined more than seasonally during the week ended Sept. 10. The output was 1.8 per cent above the corresponding amount in 1948, as compared with a similar advance of 1.4 per cent shown for the preceding week.

Railway freight loadings during the same period totaled 624,197 cars, 11.3 per cent less than the figure for the week before and 20.5 per cent below the corresponding number recorded in 1948.

Crude oil production in the week ended Sept. 10 averaged 4,850,550 barrels daily, 89,050 barrels less than in the preceding week and 495,500 under the comparable output in 1948.

Production of bituminous coal and lignite during the same week is estimated at 5,825,000 net tons, 2,225,000 less than the output in the week before and 6,355,000 below the corresponding quantity in 1948.

Civil engineering construction volume reported for the week ended Sept. 15, according to Engineering News-Record, was \$150,921,000, or six per cent more than the preceding weekly figure, but 15 per cent below the comparable sum in 1948. The total recorded for 37 weeks of this year was 18 per cent more than the corresponding amount in 1948. Private construction for the period was 15 per cent above that a year ago, and public construction increased by 21 per cent.

The wholesale price index of the Bureau of Labor Statistics during the week ended Sept. 6, at 152.7 per cent of the 1926 average, was 0.2 per cent more than in the preceding week, but 9.3 per cent below the corresponding figure in 1948. Increases in prices of print cloth and raw sugar established new records for the year, while cotton prices declined to the lowest level since January, 1947.

Member bank reserve balances increased \$227 million during the week ended Sept. 14. Underlying changes thus reflected include decreases of \$138 million in Treasury deposits with Federal Reserve banks and \$135 million in money in circulation and increases of \$24 million in Reserve bank credit and \$2 million in gold stock.

Total loans and investments of reporting member banks decreased \$90 million during the week ended Sept. 7. An advance of \$42 million in commercial, industrial, and agricultural loans was recorded. The sum of these business loans, \$13,007 million, shows a net decrease of \$1924 million in 12 months.

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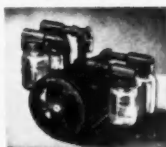


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BOOKS ...

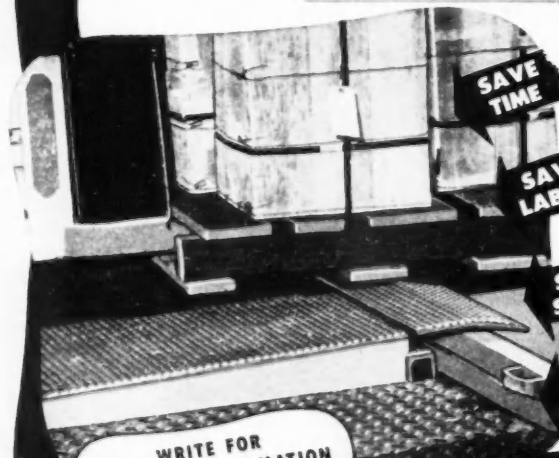
CONSTRUCTIVE USES OF ATOMIC ENERGY, edited by S. C. Rothmann; Harper and Brothers, Publishers, 1949; illustrations, tables, graphs; 258 pp. \$3.00.

Here is a compact source book dealing with the possible uses of atomic energy for constructive purposes. Fourteen articles presented in easily understandable form, written by scientists who are among the leaders in atomic research in many fields, beginning with Dr. Arthur H. Compton, the Nobel-Prize-winning physicist, demonstrate clearly the potentialities of nuclear energy outside the realm of war. These articles represent the end result of a four-year search through a great mass of literature in an effort to find material which would dispel the common misconception that atomic energy is beyond the comprehension of laymen. There is no claim that after reading this book the layman will understand atoms and atomic energy in detail. If this book leads to the reader's acceptance of the fact of atomic energy and the possibilities of its use, it will have served a useful purpose.

The chapters, Atomic Energy as a Human Asset by Arthur H. Compton, The World Within the Atom by L. W. Chubb, Atomic Energy in Industry and the Physical Sciences by Samuel K. Allison, Industrial Applications of Radioactivity by M. Blau and J. R. Carlin, Atomic Energy for Industry by H. Etherington, Radioactive Tracers in Metallurgical Research by E. S. Kopecki, and Atomic Engines for Aircraft by Andrew Kallitinsky should prove of value and interest to readers of AUTOMOTIVE INDUSTRIES.

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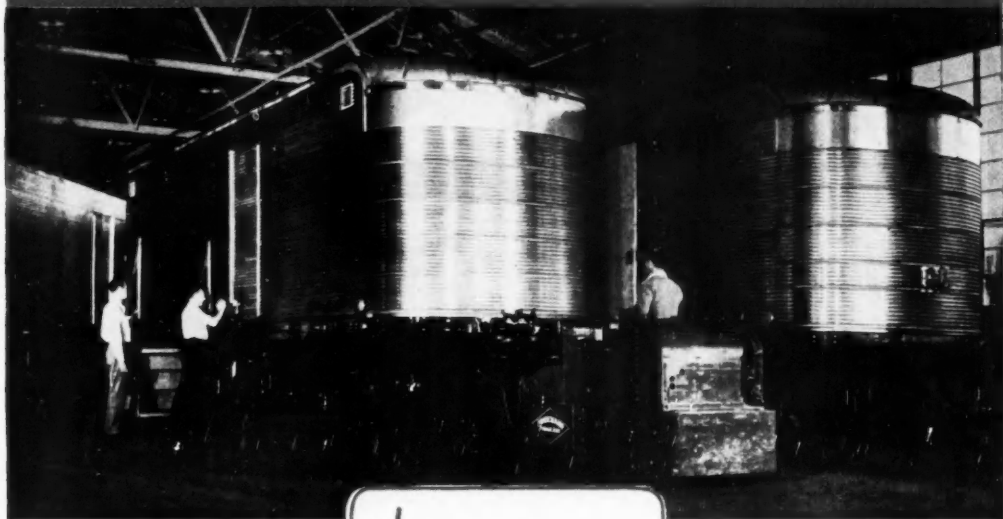
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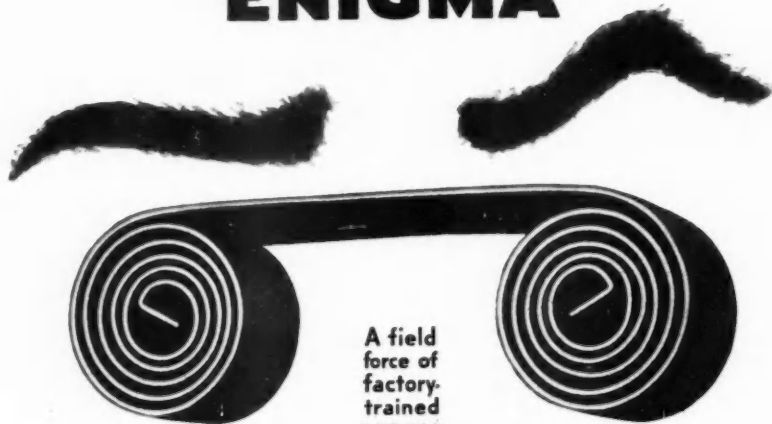
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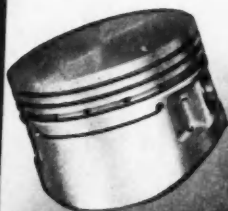
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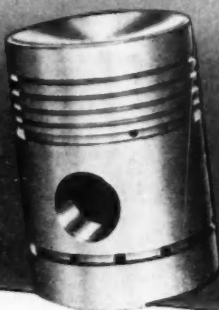
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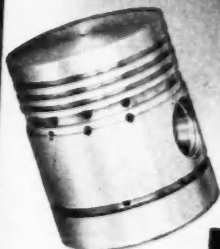
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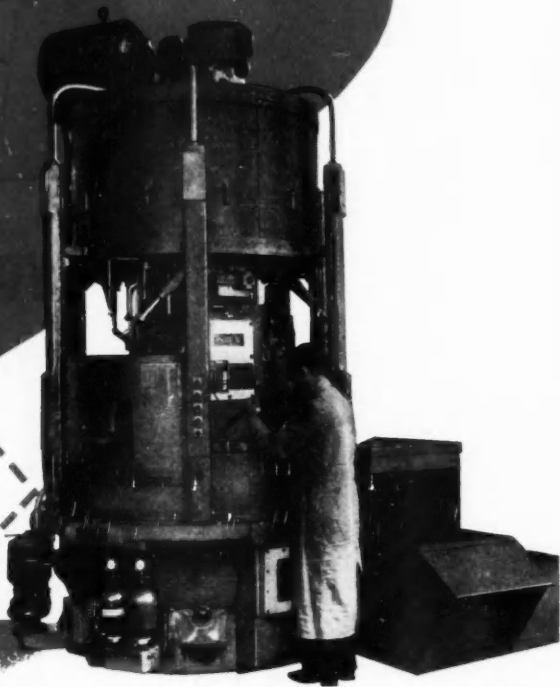
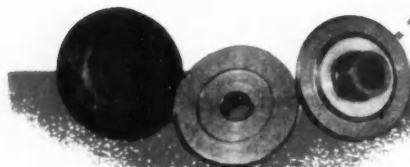


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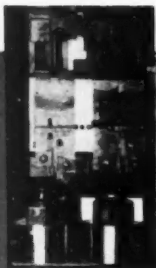
There are 19 operations combined in the 1st and 2nd chuckings. Each index of the machine delivers a finished piece. When writing for information refer to ad XK



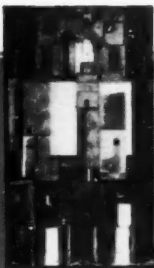
STATION 1



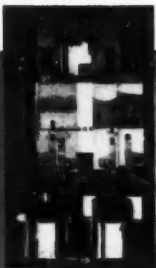
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STATION 3



STATION 4



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STATION 6

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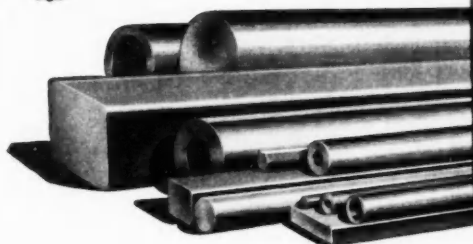
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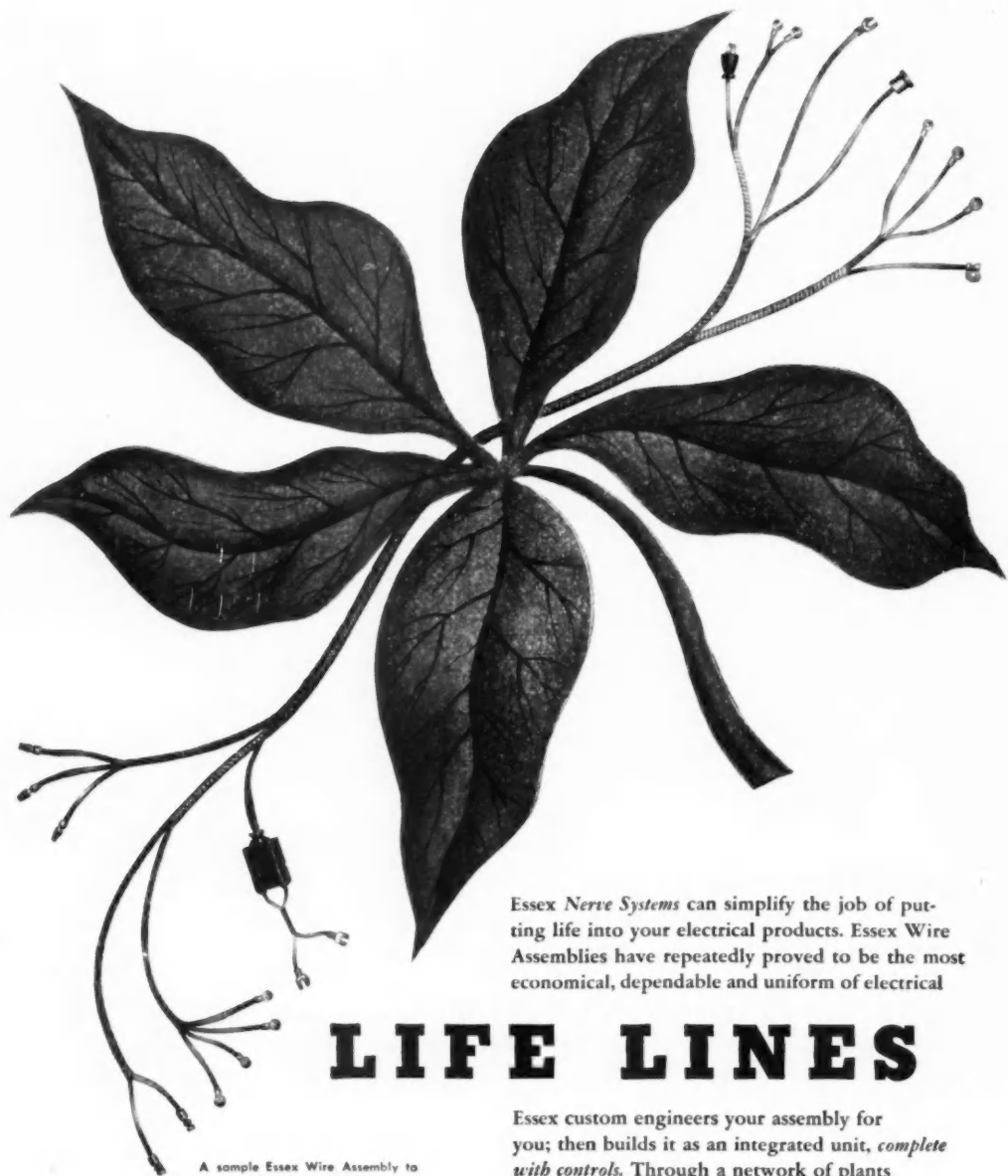
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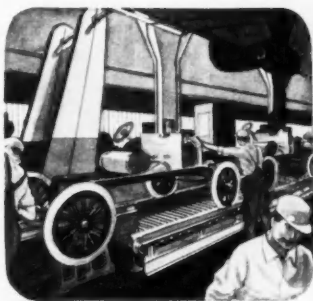
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1 1875—Wisconsin offered a \$10,000 reward to the person who would invent a steam carriage. George Seldon, Rochester, N. Y., was first and collected . . . America's great auto industry was under way.

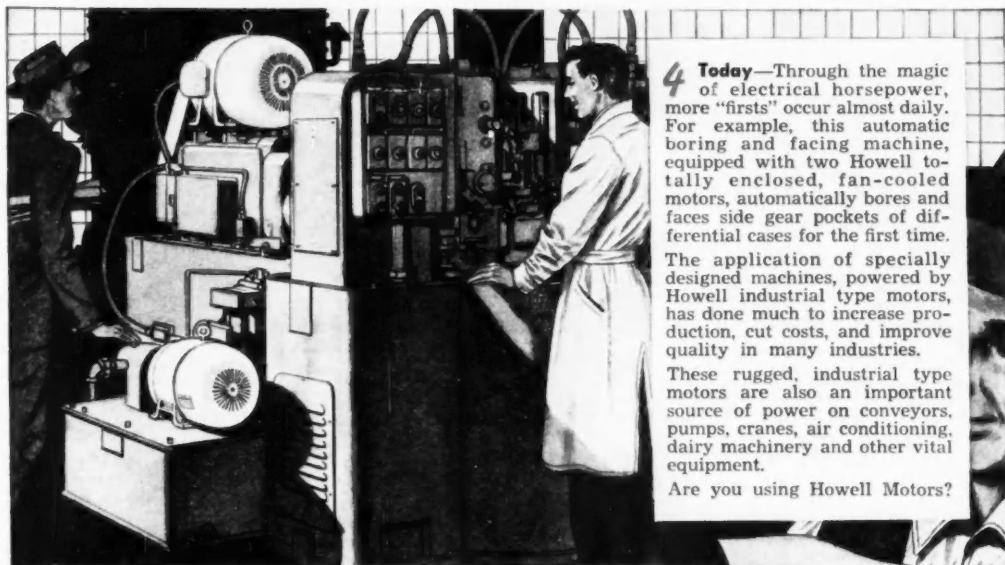


2 1892—First gasoline-driven car was built by Charles Duryea with screw drivers and wrenches. Machine tools to aid this growing industry soon appeared. But parts still had to be assembled by hand.



3 1913—First moving assembly line was used in auto plants! Gone, now, was much of the labor of carrying parts. In 1915, Howell "Red Band" Motors appeared and soon were widely accepted in industry.

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... both are "jet-assisted" by
AMERICAN PHILLIPS SCREWS

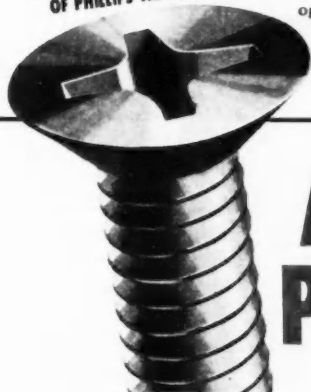
NEW ALTITUDE MARKS IN ASSEMBLY: Savings zoom skyward when American Phillips Screws take over the cost-controls in any assembly operation. *Time-savings alone climb as high as 50% . . . over old-fashioned, slowpoke, fumble-and-fume slotted screws!* Meanwhile spoilage and rejects . . . yes, and lost-time accidents, too . . . are grounded once and for all.

NEW ALTITUDE MARKS IN SALES: Next time you board a commercial airliner . . . or any plane, for that matter . . . look around you and see what the aviation industry thinks of American Phillips Screws. *They use almost nothing else but!* And aside from the assembly savings and the vibration-proof fastenings, there's another customer-consideration in there, also . . . because there's never a burr on a Phillips head to snag clothes or scratch hands. Buyers of everything from airplanes to zithers, what's more, are coming to recognize and look for the American Phillips crossed recess as a sure surface index of inbuilt quality in any product. Does yours have this sales advantage? Just write:

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Screws



ALL TYPES

ALL METALS: Steel, Brass, Bronze, Stainless Steel, Aluminum, Monel, Everdur (silicon bronze)

For Big Jobs or Small ... Simple or Complicated ...

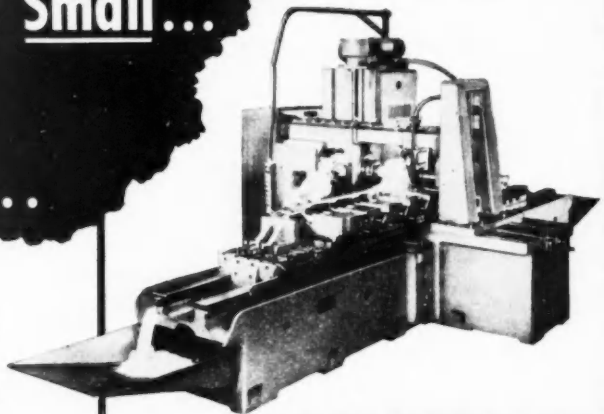
You'll get better Milling Methods with **SUNDSTRAND** "Engineered Production" and Equipment

Here are some representative examples of machine tools, equipment and services offered by the Machine Tool Division of Sundstrand. Standard basic machine designs and units, coupled with methods engineering assistance, has resulted in many cost-saving Sundstrand installations. In addition to the basic standard unit type machine designs, you will find various attachments and accessories to speed up operations. All have been time-tested and proven in past performance. If you have metalworking operations in your plant and are interested in lowering manufacturing costs, call in a Sundstrand representative. He'll be glad to assist you in obtaining more economical methods.

There is no obligation for this service.

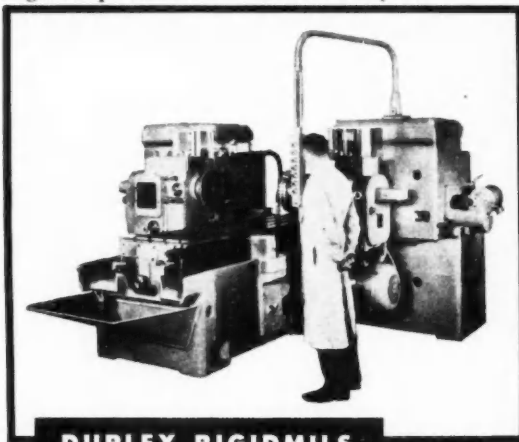


RIGIDMILS • FLUID SCREW RIGIDMILS • AUTOMATIC LATHES • HYDRAULIC EQUIPMENT



SIMPLEX RIGIDMILS

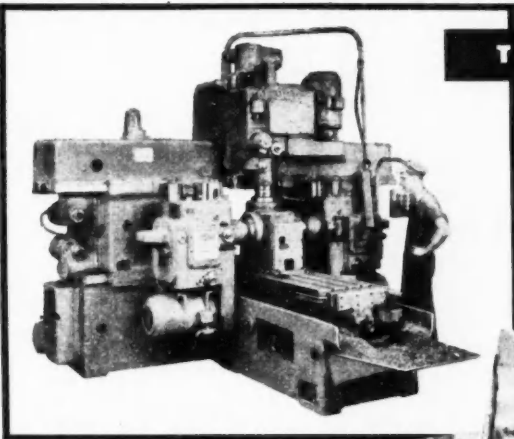
Either slab or face milling can be performed on this single spindle Rigidmil. This type machine can be furnished with 25, 30, 40, 50 or 75 horsepower heads. Table widths are 18", 24" or 30" and table feed strokes up to 168 inches. Larger or special sizes are available on request.



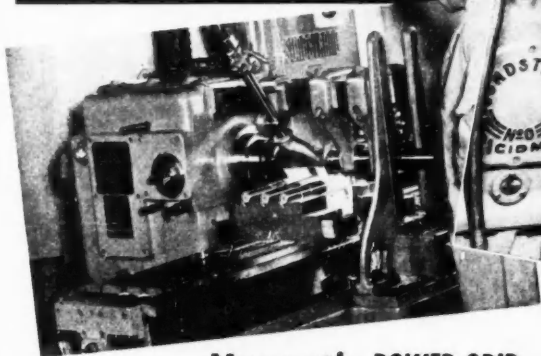
DUPLEX RIGIDMILS

Machine has two horizontal opposed independently motor driven spindle heads which can be furnished in 15, 25, 30, 40 or 50 HP capacities. Table widths are 18", 24" or 30" and table feed strokes up to 168 inches. Larger or special sizes are available on request. Machine shown has spindle heads mounted on adjustable columns so as to handle a much wider range of work pieces. Power movement is provided for this column adjustment. A fixed column duplex type machine can be furnished if desired.

TRIPLEX RIGIDMILS

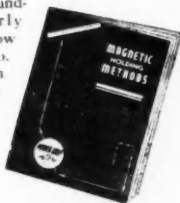


This highly productive Sundstrand Rigidmil has been developed to add flexibility to a production type milling machine so that both wide and narrow parts can be machined without sacrifice in accuracy. Three spindle heads, one vertical and two horizontal, can be adjusted to mill three sides of a work piece simultaneously or operate individually. Heads are independently motor driven and each can be furnished in either 15, 25 or 50 HP capacities. Machines can be furnished in table widths of 24" and 30" and feed strokes up to 168 inches with larger or special sizes available on request.



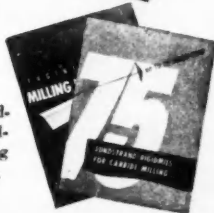
Magnetic POWER-GRIP Holding Methods and Devices

Illustrated above is a Model Rigidmil equipped with a Power-Grip Magnetic Fixture for holding three shafts for a keyway milling operation. Use of a magnetic fixture not only simplified and speeded up the loading operation but reduced the cost of the work-holding equipment over conventional holding methods. Magnetic fixtures are manufactured by the Sundstrand Magnetic Products Co. (formerly Rockford Magnetic Products Co.) which is now a division of the Sundstrand Machine Tool Co. Their Power-Grip Chucks are an easy solution to many work-holding problems. Their deep magnetic penetration eliminates the need for complex, expensive holding fixtures on either simple or odd shaped work pieces. Write for bulletin number MC-288 on magnetic holding methods. Better still, send prints and specifications for our recommendations on Power-Grip holding equipment.



Additional Data

For more complete information on Sundstrand Simplex, Duplex and Triplex Rigidmils and Sundstrand Engineered Milling Methods, write for bulletins number 288.



Automatic Index Bases

Illustrated above is a standard Sundstrand Automatic Index Base mounted on a milling machine table. The base is provided with eight stations with two parts held in each station. Table cycling and indexing are automatic. Consequently, the operator merely loads and unloads two parts while two are being machined. Production is 800 pieces per hour. Standard Index Bases are available in sizes from 8" to 30" in diameter. For more information, ask for bulletin number IB-288.



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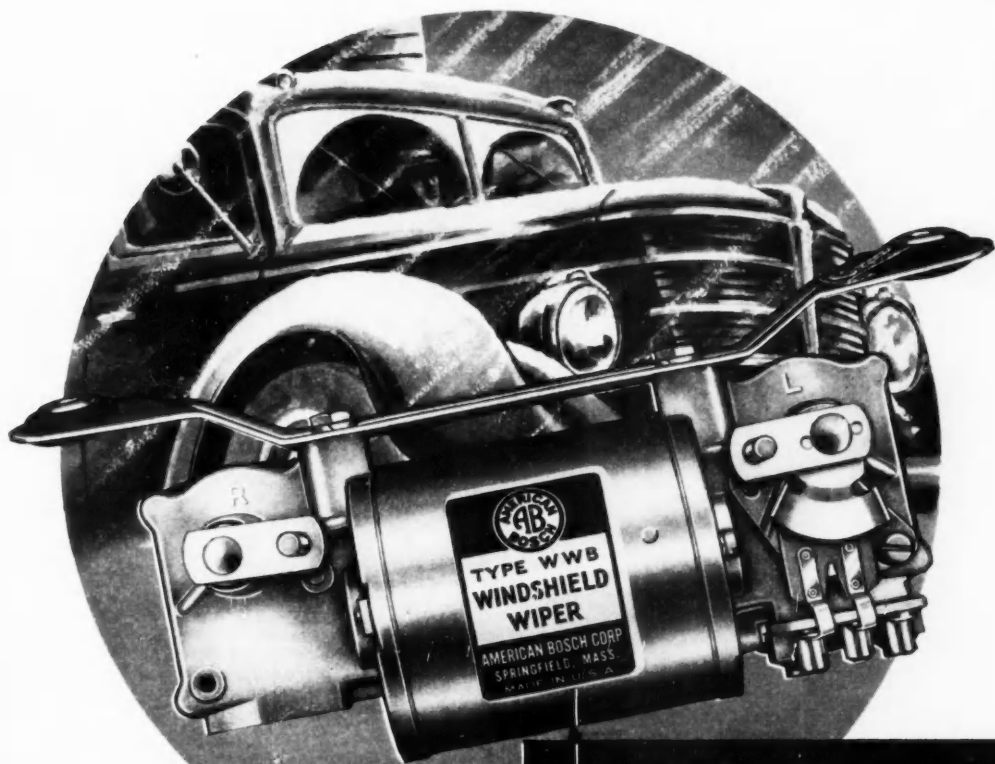
reduces the cost of the mount itself . . . effecting a *double economy* for the motor car manufacturer!

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- ✓ Cowl or header mounting
- ✓ Automatic thermal cutout
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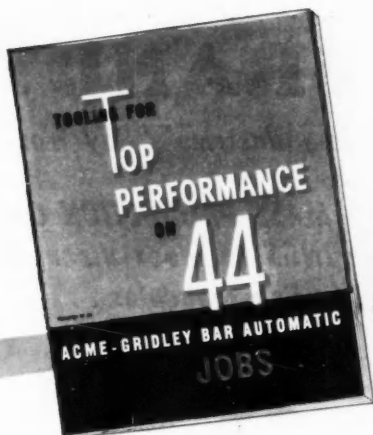
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Range of Models and Sizes of Acme-Gridley Bar Automatics	42-43
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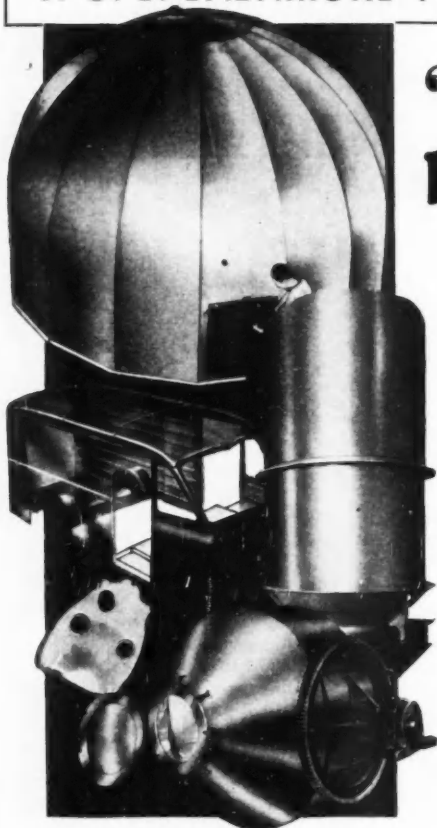
ACME-GRIDLEY BAR AUTOMATICS built in 4, 6 and 8 spindle styles, maintain accuracy at the highest spindle speeds and fastest feeds modern cutting tools can withstand.

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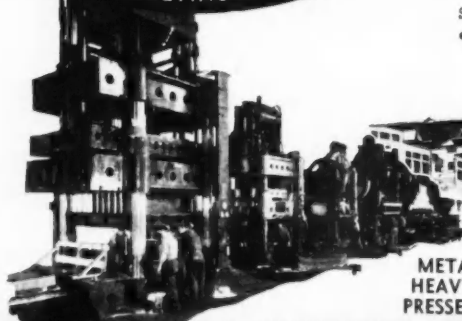
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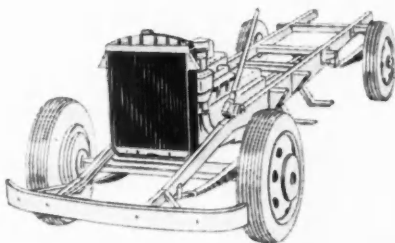
engineered cooling system

Sure, the radiator is the basic unit of any cooling system—for car, truck, bus or tractor. But there's a lot more to be considered.

What a vehicle manufacturer really wants . . . and what he gets when he consults Harrison . . . is an *engineered cooling system* that provides the most effective cooling at the lowest possible price.

This involves recommendations on such factors as fan location, shrouding of the radiator core, restrictions of air movement, and radiator mounting. The net result is a reduction in core cost, in mounting cost and in assembly cost.

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**RADIATORS, OIL COOLERS, THERMOSTATS,
HEATERS, DEFROSTERS**

A simple way to DO something about **ECONOMY-IN-PRODUCTION**

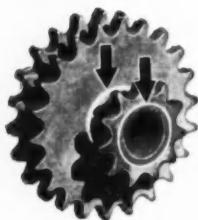
EASY-FLO brazing this motorcycle handlebar instead of welding it saved 8¢ per assembly—a saving that grows big when you multiply it by thousands of assemblies.



Everybody is talking about economy-in-production. It's the keynote of the Metal Show to be held in Cleveland, October 17 to 21. But what counts most is *doing* something about it. In some cases, of course, that's not always so easy. There are, however, hundreds of fabricating operations where economy could be quickly effected by using methods which can be readily adopted.

One such method that offers quick results is **EASY-FLO** and **SIL-FOS** low-temperature silver alloy brazing. It has boosted production and cut costs on thousands of products. Illustrated are a few typical tried and proved ways to

BRAZE AND SAVE WITH EASY-FLO AND SIL-FOS



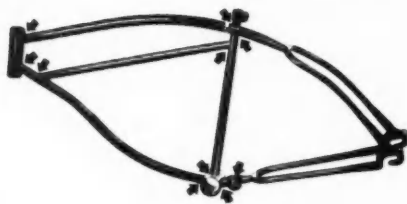
Big savings are possible on many parts now machined from the solid by changing to a built-up assembly brazed with EASY-FLO. The triple-sprocket above and hose nozzle adjusting part at right are good examples.



Attaching spuds to many types of equipment can be done faster and cheaper with EASY-FLO and SIL-FOS brazing. Using EASY-FLO and induction heating, instead of soft soldering by hand, reduced cost on the automobile oil pan spud (left) from \$11.00 to \$4.50 per hundred.



Plenty can be saved on many parts now cast, by changing to EASY-FLO or SIL-FOS brazed construction. The gas burner (above), once an iron casting, is now made of tubular steel members EASY FLO brazed at about 50% lower cost.



Finishing is another operation on which EASY-FLO and SIL-FOS brazing can save plenty. The maker of the EASY-FLO brazed bike frame (above) says—"This method produces joints of great strength which are absolutely clean—free from excess brazing metal—making possible a better looking enamel finish."

DO THIS—NOW

Write today for Bulletins 12-A and 15. They'll give you full EASY-FLO and SIL-FOS details. To get down to brass tacks in a hurry, ask to have a representative call. No obligation.

IF YOU GO TO THE METAL SHOW

in Cleveland be sure to see the EASY-FLO and SIL-FOS working exhibit. Brazing experts always at hand to answer your questions and discuss your metal joining problems.

BOOTH 337



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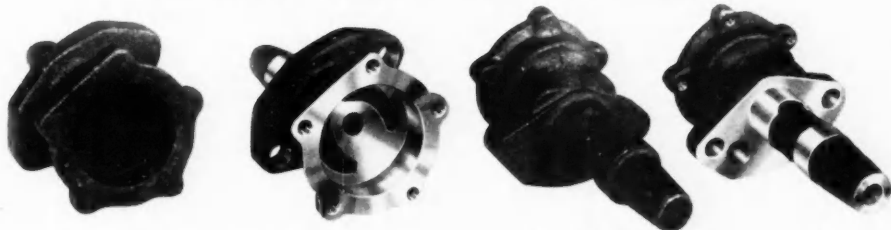
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- ★ TAP

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We, at Chilton, believe that maintaining the American standard of living demands prompt action toward easing the taxes that burden business . . . toward encouraging the flow of venture capital. This, we feel, is the key to progress, to a new peak in employment, to job-security.

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Write or call your nearest Matthews Sales Office today for BULLETIN B-6 and complete information on nameplate marking.

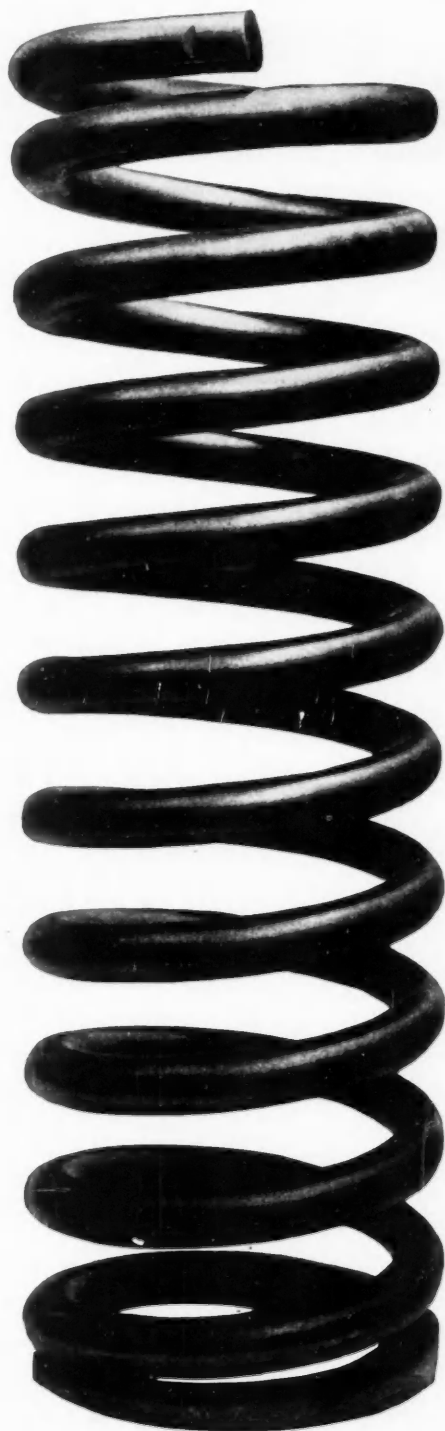


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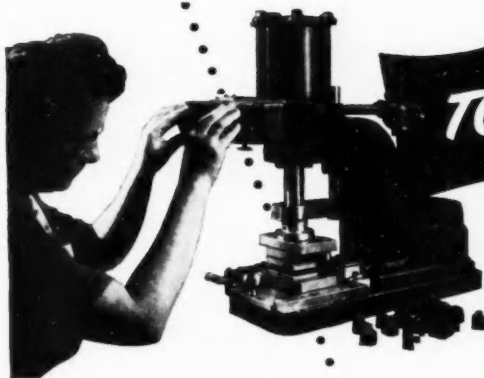
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USE ORDINARY SHOP AIR SUPPLY! Easy to connect. Every operating convenience. Ram speed adjustable; automatic return. Removable base plate facilitates "quick change" set-ups. Offered in 1/2 ton and 1 ton sizes. **ASK FOR BULLETIN 251.**

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For "A Thousand and One" Uses . . .

Riveting . . . staking . . . punching . . . pressing . . . assembling . . . marking . . . and for countless other uses, it's the handiest press you've ever used for light production work!

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with FOLDING BACK REST



MILSCO COMMANDER
with REMOVABLE CUSHION

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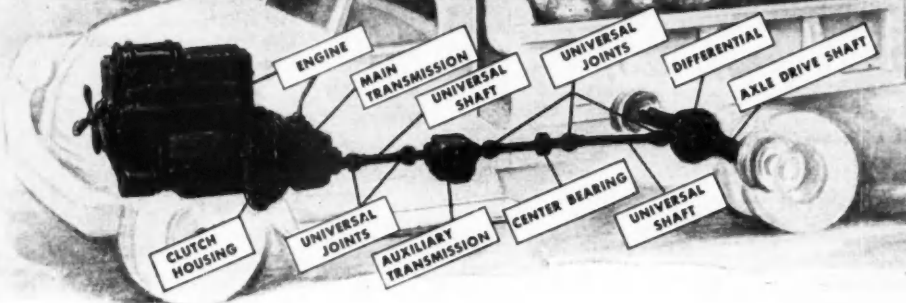
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NO CHATTER! NO BABYING!**

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PREVENTS SHOCK ABUSE OF Gears, Drive Shaft, Universal Joints, Axles and other Vital Points . . .

No other clutch on the market gives you all the advantages of the Lipe ML Clutch. It drastically reduces maintenance and lay-ups . . . prevents a lot of wear and tear on your vehicle . . . and gives your driver easier control.



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LOADING . . .**

**LESS MAINTENANCE
MORE HOURS ON
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**Always Use LIPE ML
Non-Shock CLUTCH!**

HAS ONLY ONE SPRING — It operates twenty levers simultaneously. All of them act on the pressure plate at the same instant.

RESULT—Uniform pressure . . . absolute parallelism . . . smoother engagement.

COOLER OPERATION — Throughout the clutch assembly, the 20 louvred levers act like a high-speed fan. They circulate cooling air while the clutch is in operation.

RESULT—Less heat . . . less pressure plate warpage . . .

EASIER ADJUSTMENT — When friction material wears down, you can easily compensate for it on the Lipe ML Clutch by removing shims from the cover plate. This adjustment does not affect the dynamic balance of the clutch.

RESULT—Restores torque capacity of clutch throughout the life of the friction material.

EASIER MAINTENANCE — You can disassemble and reassemble the Lipe ML Clutch with ordinary tools.

RESULT—You save considerable mechanics' time . . . put your vehicles back on the road more quickly.

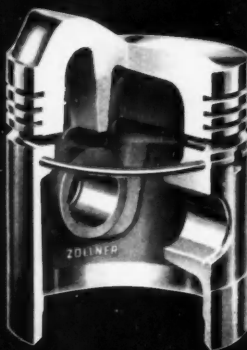


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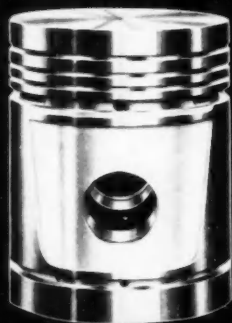
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